

U.S. DEPARTMENT OF COMMERCE  
National Technical Information Service

PB-282 788

# Inspection of AEROS Data to Develop System Enhancements

Engineering-Science, Inc, McLean, Va

Prepared for

Environmental Protection Agency, Research Triangle Park, N C

Dec 77

**EPA-450/3-77-052**

**PB 282 788**

**December 1977**

**INSPECTION  
OF AEROS DATA  
TO DEVELOP  
SYSTEM ENHANCEMENTS**



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**NATIONAL TECHNICAL  
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U. S. DEPARTMENT OF COMMERCE  
SPRINGFIELD, VA. 22161

**U.S. ENVIRONMENTAL PROTECTION AGENCY**  
**Office of Air and Waste Management**  
**Office of Air Quality Planning and Standards**  
**Research Triangle Park, North Carolina 27711**

**INSPECTION OF AEROS DATA  
TO DEVELOP  
SYSTEM ENHANCEMENTS**

by

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Contract No. 68-02-1894

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Prepared for

ENVIRONMENTAL PROTECTION AGENCY  
Office of Air and Waste Management  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711

December 1977

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Publication No. EPA-450/3-77-052

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   |                                                  |                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------|--------------------------------------------------|----------------------------------------------------|
| <b>BIBLIOGRAPHIC DATA SHEET</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 1. Report No.<br>EPA-450/3-77-052 | 2.                                               | 3. Accession/Classification No.<br><b>PR282788</b> |
| 4. Title and Subtitle<br>Inspection of AEROS Data to Develop System Enhancements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |                                   | 5. Report Date<br>December 1977                  |                                                    |
| 7. Author(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                                   | 6.                                               |                                                    |
| 9. Performing Organization Name and Address<br>Engineering-Science<br>7903 Westpark Drive<br>McLean, Virginia 22101                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |                                   | 8. Performing Organization Rept. No.             |                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   | 10. Project/Task/Work Unit No.<br>Task Order 1   |                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   | 11. Contract/Grant No.<br>68-02-1894             |                                                    |
| 12. Sponsoring Organization Name and Address<br>U.S. Environmental Protection Agency<br>Office of Air and Waste Management<br>Office of Air Quality Planning and Standards<br>Research Triangle Park, North Carolina 27711                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                                   | 13. Type of Report & Period Covered<br>Final     |                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   | 14.                                              |                                                    |
| 15. Supplementary Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                   |                                                  |                                                    |
| 16. Abstracts<br>Data from the National Emissions Data System (NEDS) and the Storage and Retrieval of Aerometric Data (SAROAD) system were reviewed to develop enhancements to these systems. Proposed Source Classification Codes (SCCs) were reviewed, and recommendations were made to the National Air Data Branch (NADB) for the adoption of new SCCs. The data records coded with ten non-specific SCCs which end in -99 were reviewed to identify more specific SCCs which could be added to the master list. Verification criteria which could be used to identify anomalous emissions data were tested. A proposed index to quantify the quality of data in an emission inventory was evaluated. |  |                                   |                                                  |                                                    |
| 17. Key Words and Document Analysis. 17a. Descriptors<br>Air Pollution<br>Emission Inventory<br>Source Classification Code<br>National Emissions Data System<br>Storage and Retrieval of Aerometric Data System<br>Air Quality Data                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |                                   |                                                  |                                                    |
| 17b. Identifiers/Open-Ended Terms<br>Aerometric and Emissions Reporting System<br>Data Handling Systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                   |                                                  |                                                    |
| 17c. COSATI Field Group                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                   |                                                  |                                                    |
| 18. Availability Statement<br>Release Unlimited                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   | 19. Security Class (This Report)<br>UNCLASSIFIED | 21. No. of Pages<br>118                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   | 20. Security Class (This Page)<br>UNCLASSIFIED   | 22. Price<br>AD6/ME                                |

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CHAPTER I  
INTRODUCTION

The Aerometric and Emissions Reporting System (AEROS) handles vast quantities of data on air quality, pollutant emissions, meteorological information, and stack tests. AEROS data are used by the U. S. Environmental Protection Agency (EPA), State and local air pollution control agencies, State and Federal Legislators, and private contractors. The uses of the data are manifold and varied.

The National Air Data Branch (NADB), which is charged with the supervision of AEROS, is concerned that the individual systems in AEROS and the data handled by those systems may not be of sufficient quality to meet the needs of the various users. NADB has identified some problems with the quality of data in AEROS that may require improvements to some of the systems that comprise AEROS. To resolve some of these specific data quality problems, data were retrieved from the National Emissions Data System (NEDS) and the Storage and Retrieval of Aerometric Data (SAROAD) system to examine suspected problem areas.

Little improvement was found necessary for the SAROAD system because it is operated in a fairly straight forward manner and requires few decisions for users.

The NEDS system, however, had required users to make subjective decisions because of complexities stemming from the wide variety of data in the system. Attention was focussed on the following potential system improvements:

1. To define more specific Source Classification Codes (SCCs) and thereby reduce the number of point sources coded in the unclassified category. The usefulness of NEDS is impaired by the large number of sources coded with other/not classified SCCs. Numerous new codes proposed by the Texas Air Control Board (TACB) and the Radian

Corporation were reviewed. Adoption of these proposed codes would reduce the number of processes now coded with the indiscriminate 99 code ending and enable coders to supply more specific process information to NEDS. In addition, NEDS records for ten existing 99 SCCs were reviewed with the objective to define and reassign the records specific codes. The feasibility of more specific SCCs being developed through a review of existing NEDS records was also explored.

2. To refine data by enhancement of editing procedures - NADB employs some editing routines to prevent grossly incorrect data from entering the systems and to identify obviously anomalous data that call for early verification. More sophisticated auditing systems are being developed. Both the existing and proposed editing procedures were reviewed, and improvements to them were recommended. Some of the validation criteria that were recommended as a result of this review were tested to determine the practicability of using such audits. Maximum and minimum values of air quality data were determined to enhance the SAROAD auditing procedures.
3. To label data for relative value. Several indices that have been proposed to aid NADB in quantifying the quality of NEDS data were reviewed to determine their feasibility. Most of these indices involve age, completeness, and correctness.

Throughout this effort, established EPA methodologies found in Volumes I through IV of the AEROS User's Manual were used. For much of the work done, however, new, innovative approaches had to be developed. Each of these were reviewed by the EPA Project Officer. Compilation of Air Pollutant Emission Factors (EPA Publication No. AP-42) and Air Pollution Engineering Manual (EPA Publication No. AP-40) were the basic references used for this study in addition to the AEROS User's Manual.

This report consists of three chapters; each chapter deals with one of the three main areas of this effort. In Chapter II, the review of the SCCs

proposed by TACB and Radian is discussed and the codes recommended for approval are listed. This chapter also discusses the feasibility study of developing new, more specific SCCs by reviewing the NEDS records of sources currently coded with other/not classified codes. Recommendations are made; if adopted, they should facilitate the development of new, more specific SCCs in the future. In Chapter III, enhancements to AEROS data auditing systems are discussed. Chapter IV reviews the feasibility of proposed emission inventory quality indices. The Source Classification Codes proposed by TACB and Radian are included in the appendices.

## CHAPTER II

### EVALUATION OF PROPOSED AND NEW SOURCE CLASSIFICATION CODES

The Source Classification Codes (SCCs) are the basic "building blocks" upon which the National Emissions Data System (NEDS) is structured. Each SCC represents a process or process activity within a source category. An SCC consists of four categories of codes. The Category I code is a one-digit code which designates the general type of emission source: external combustion boiler, internal combustion engine, industrial process, point source evaporation, solid waste, and miscellaneous. The next two digits, the Category II code, further subdivides emission sources in accordance with the particular industry or fuel type. For example, the industrial process category (category 3-) is subdivided into chemical manufacturing, food/agriculture processing, primary metals manufacturing, etc. The Category III three-digit code designates a specific industry within the generalized Category II industry such as paint manufacturing, synthetic fibers, plastics, etc. The last two digits of the eight-digit SCC, the Category IV code, specify the unit operation which emits the pollutants such as a dryer, kiln, reactor, etc. The Environmental Protection Agency (EPA) publishes a master list of SCCs and associated emission factors in Compilation of Air Pollutant Emission Factors (EPA Publication No. AP-42).

EPA has identified two problems with the SCC master list which would limit the usefulness of the system because they restrict the ability of users to identify emissions from specific processes:

- o EPA continually revises AP-42 providing emission factors for newly identified emission points/processes and for previously undefined sources. The SCC master list must also be revised to incorporate these new SCC emission factors.
- o At the present time, approximately 20% of all codes in the SCC master list are designated "other/not classified", i.e., they end in 99.

In addressing these particular problems and in an effort to upgrade the master list, EPA initiated this contractual effort. The SCCs proposed recently by the Texas Air Control Board (TACB) and Radian Corporation were reviewed and the feasibility of developing new SCCs using the information in the NEDS comments field associated with the "other/not classified" codes was analyzed.

### EVALUATION OF PROPOSED CODES

Early in 1976, TACB proposed that 672 new codes be added to the SCC master list. TACB identified the need for these codes when much of the source data, which were reported on plant questionnaires, had to be coded as other/not classified and, thus could not be retrieved for analysis. Codes were then developed for processes listed in Common Petrochemical Compounds (API Bulletin No. 2523) and EPA Selected High Pollution Processes (EPA Publication No. 450/3-73-006-b). Codes were also developed for the production of those chemicals not listed in the above references when the annual emissions from the production of such chemicals were found to be greater than 25 tons of any one criteria pollutant. Table II-1 lists the number of codes proposed for each of ten industrial classes. (A complete list of TACB's proposed codes is included in Appendix A.)

TABLE II-1  
SUMMARY OF CODES PROPOSED BY TACB

| SOURCE CATEGORY                        | NUMBER OF CODES |
|----------------------------------------|-----------------|
| Chemical Manufacturing                 | 127             |
| Primary Metals                         | 12              |
| Petroleum Industry                     | 15              |
| Natural Gas Industry                   | 13              |
| Plastic Fabrication                    | 15              |
| Cleaning Solvents                      | 24              |
| Surface Coating                        | 2               |
| Petroleum Product Storage              | 17              |
| Petrochemical Marketing/Transportation | 260             |
| Petrochemical Product Storage          | <u>187</u>      |
|                                        | 672             |

As part of a study to upgrade and refine evaporative hydrocarbon emission factors related to the petroleum industry, Radian Corporation proposed 202 new SCCs. These were designed to accommodate new and/or revised emission factors that had been developed. These proposed codes covered the

source categories of petroleum product storage, petrochemical storage, and petroleum product marketing/transportation. Table II-2 indicates the number of codes proposed for each category. Appendix B contains a detailed listing of these codes. In proposing revisions to the SCCs, Radian reviewed TACB's proposed codes as well as EPA's existing codes and recommended several possible actions. Those codes were reviewed for which Radian recommended one of the following actions:

- o Adoption of a proposed TACB code without change;
- o Change of source title and emission factor for an existing EPA code;
- o Adoption of a proposed TACB code but with a different source title and emission factor; and
- o Addition of an entirely new SCC.

In order to determine if the proposed additions/revisions should be incorporated into the master list, all of the codes proposed by TACB and Radian were evaluated, except those proposed by TACB for the petroleum industry (SCC category 3-06 found in Appendix A, page 11.)

TABLE II-2  
SUMMARY OF CODES PROPOSED BY RADIAN

| SOURCE CATEGORY                            | NUMBER OF CODES |
|--------------------------------------------|-----------------|
| Petroleum Product Storage                  | 92              |
| Petrochemical Product Storage              | 60              |
| Petroleum Product Marketing/Transportation | <u>50</u>       |
|                                            | 202             |

#### Results and Recommendations

Based upon the review of the codes proposed by TACB and Radian, the adoption of the codes listed in Table II-3 is recommended. Certain modifications to the codes proposed by TACB and Radian are recommended. These recommended modifications are discussed below in terms of the specific industry for which the codes were proposed rather than in general terms.

### Chemical Industry

TACB proposed 127 codes for chemical industry operations. It is recommended that 123 new codes be added to the SCC master list and that five existing codes be redesignated. These recommended codes are the same as those proposed by TACB with the following exceptions:

1. The six candidate codes proposed by TACB which were to be designated by trade names should not be adopted. A table (see Table II-4) cross-referencing trade names and chemical names should be provided with the SCC master list and should include the code 99 shown in the table for use in coding the processes.
2. Compounds should be grouped according to their chemical class. New codes are, therefore, recommended for seven chemical classes: alcohols, glycols, ketones, ethers, nitriles, chlorides, and amines/amides. This arrangement should help to keep the table short and compact as well as facilitate its usage while providing for future expansion.
3. The designation of two existing codes should be changed. Formaldehyde should be redesignated aldehyde so that SCCs designating the production of a number of aldehydes can be grouped. Category IV codes 01/02 should still refer to the manufacture of formaldehyde. The existing code for ethylene dichloride should be redesignated dichloroethane. The existing codes refer to one isomer of the compound (1, 2 dichloroethane). The name change will facilitate including the second isomer (1, 1 dichloroethane).
4. The designations of six codes proposed by TACB were changed to facilitate grouping and/or to prevent confusion. Four of these six codes were proposed for compounds resulting from the chlorination of methane. It is recommended that these codes be grouped under the name chloromethane. In most processes these compounds are by-products. Because the unit operations involved in their manufacture are similar, fewer codes will be needed in the future to inventory these processes. The proposed general code for Freon<sup>®</sup> was redesignated "fluorocarbons" inasmuch as Freon<sup>®</sup>

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup>

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING  
PLASTICS

- 3-01-018-03 PVC/FAB
- 04 POLYPROPYLENE/FAB
- 06 BAKELITE/FAB
- 10 HIGH DENSITY POLYETHYLENE
- 11 HIGH DENSITY POLYETHYLENE/FAB
- 15 LOW DENS POLYETHYLENE
- 16 LOW DENS POLYETHYLENE/FAB
- 20 MELAMINE
- 21 MELAMINE/FAB
- 25 POLYBUTADIENE
- 26 POLYBUTADIENE/FAB
- 30 POLYESTER
- 31 POLYESTER/FIBERGLASS REINF FAB
- 35 POLYSTYRENE
- 36 POLYSTYRENE/FAB
- 37 POLYSTYRENE/STYROFOAMFAB
- 40 POLYURETHANE
- 41 POLYURETHANE/FAB

PHTHALIC ANHYDRIDE

- 3-01-019-05 VIA NAPHTHALENE
- 10 VIA O-XYLENE

AMINES/AMIDES

- 3-01-034-05 DIETHYLAMINE
- 10 TERTBUTYLAMINE
- 15 ETHANOLAMINE
- 20 ETHYLENEAMINE
- 25 HEXAMETHYLENEDIAMINE
- 30 NPROPYLAMINE
- 35 UREA

KETONES

- 3-01-091-01 ACETONE
- 15 METHYL ETHYL
- 10 METHYL ISOBUTYL
- 99 OTHER/NOT CLASFD

ALDEHYDES

- 3-01-120-01 FORMALDEHYDE/SILV CAT
- 02 FORMALDEHYDE/MIX OXID CAT
- 10 BUTYRALDEHYDE
- 15 PARAFORMALDEHYDE
- 20 ACETALDEHYDE/VIA ETHYLENE
- 25 ACETALDEHYDE/VIA ETHANOL
- 99 OTHER/NOT CLASFD

DICHLOROETHANE

- 3-01-125-01 1,2 DICHLOROETHANE/SILVER CAT
- 02 1,2 DICHLOROETHANE/DIRECT CHLORNTN
- 98 1,2 DICHLOROETHANE/OTHER NOT CLASS
- 99 1,1 DICHLOROETHANE/OTHER NOT CLASS

<sup>1</sup> Units are tons of product

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

|                        |                                    |  |
|------------------------|------------------------------------|--|
| DICHLOROETHENE         |                                    |  |
| 3-01-178-98            | 1,1 DICHLOROETHENE/OTHER NOT CLASS |  |
| -99                    | 1,2 DICHLOROETHENE/OTHER NOT CLASS |  |
| ACETIC ACID            |                                    |  |
| 3-01-131-01            | VIA METHANOL                       |  |
| -05                    | VIA BUTANE                         |  |
| -10                    | VIA ACETALDEHYDE                   |  |
| -99                    | OTHER/NOT CLASFD                   |  |
| ACETIC ANHYDRIDE       |                                    |  |
| 3-01-132-01            | VIA ACETIC ACID                    |  |
| -05                    | VIA ACETALDEHYDE                   |  |
| -99                    | OTHER/NOT CLASFD                   |  |
| ACETONE CYANOHYDRIN    |                                    |  |
| 3-01-133-99            | OTHER/NOT CLASFD                   |  |
| ACETYLENE              |                                    |  |
| 3-01-134-99            | OTHER/NOT CLASFD                   |  |
| ACRYLATES              |                                    |  |
| 3-01-135-01            | BUTYL ACRYLATE                     |  |
| -05                    | ETHYL ACRYLATE                     |  |
| -10                    | METHYL ACRYLATE                    |  |
| -15                    | BUTYL METHACRYLATE                 |  |
| -20                    | ISOBUTYL METHACRYLATE              |  |
| -25                    | ETHYL METHACRYLATE                 |  |
| -30                    | METHYL METHACRYLATE                |  |
| -99                    | OTHER/NOT CLASFD                   |  |
| ACRYLIC ACID           |                                    |  |
| 3-01-136-99            | OTHER/NOT CLSFD                    |  |
| ANILINE                |                                    |  |
| 3-01-137-99            | OTHER/NOT CLASFD                   |  |
| BISPHENOL A            |                                    |  |
| 3-01-138-99            | OTHER/NOT CLASFD                   |  |
| CARBON DISULFIDE       |                                    |  |
| 3-01-139-99            | OTHER/NOT CLASFD                   |  |
| CHLOROHYDRINS          |                                    |  |
| 3-01-140-99            | OTHER/NOT CLASFD                   |  |
| CHLOROPRENE            |                                    |  |
| 3-01-141-99            | OTHER/NOT CLASFD                   |  |
| CYCLOHEXANOL           |                                    |  |
| 3-01-142-99            | OTHER/NOT CLASFD                   |  |
| CYCLOHEXANONE          |                                    |  |
| 3-01-143-99            | OTHER/NOT CLASFD                   |  |
| DICHLOROBUTENE         |                                    |  |
| 3-01-144-99            | OTHER/NOT CLASFD                   |  |
| DIMETHYL TEREPHTHALATE |                                    |  |
| 3-01-145-99            | OTHER/NOT CLASFD                   |  |
| ETHYL ACETATE          |                                    |  |
| 3-01-146-99            | OTHER/NOT CLASFD                   |  |

<sup>1</sup>Units are tons of product

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

|                    |                                |
|--------------------|--------------------------------|
| ETHYL BENZENE      |                                |
| 3-01-147-99        | OTHER/NOT CLASFD               |
| ETHYLENE OXIDE     |                                |
| 3-01-148-99        | OTHER/NOT CLASFD               |
| FLUOROCARBONS      |                                |
| 3-01-149-99        | OTHER/NOT CLASFD               |
| GLYCERINE          |                                |
| 3-01-150-01        | VIA EPICHLOROCHYDRIN           |
| -05                | VIA ALLYL CHLORIDE             |
| -10                | VIA ACROLEIN-HYDROGEN PEROXIDE |
| -15                | VIA PROPYLENE-CHLORINE         |
| -99                | OTHER/NOT CLASFD               |
| 1,6-HEXANEDIOL     |                                |
| 3-01-151-99        | OTHER/NOT CLASFD               |
| HYDROGEN CYANIDE   |                                |
| 3-01-152-01        | VIA METHANE/AMMONIA            |
| -99                | OTHER/NOT CLASFD               |
| ISOCYANATES        |                                |
| 3-01-153-99        | OTHER/NOT CLASFD               |
| ISOPRENE           |                                |
| 3-01-154-99        | OTHER/NOT CLASFD               |
| LACTIC ACID        |                                |
| 3-01-155-99        | OTHER/NOT CLASFD               |
| METHYL ACETATE     |                                |
| 3-01-156-99        | OTHER/NOT CLASFD               |
| METHYL CHLOROFORM  |                                |
| 3-01-157-99        | OTHER/NOT CLASFD               |
| METHYLCYCLOHEXANE  |                                |
| 3-01-158-99        | OTHER/NOT CLASFD               |
| METHYLCYCLOPENTANE |                                |
| 3-01-159-99        | OTHER/NOT CLASFD               |
| NITROMETHANE       |                                |
| 3-01-160-99        | OTHER/NOT CLASFD               |
| OLEFINS            |                                |
| 3-01-161-01        | ETHYLENE                       |
| -05                | PROPYLENE                      |
| -10                | BUTYLENE                       |
| -99                | OTHER/NOT CLASFD               |
| PERCHLOROETHYLENE  |                                |
| 3-01-162-99        | OTHER/NOT CLASFD               |
| PENTAERYTHRITOL    |                                |
| 3-01-163-99        | OTHER/NOT CLASFD               |
| PHENOL             |                                |
| 3-01-164-99        | OTHER/NOT CLASFD               |
| PROPYLENEOXIDE     |                                |
| 3-01-165-99        | OTHER/NOT CLASFD               |
| STYRENE            |                                |
| 3-01-166-99        | OTHER/NOT CLASFD               |

<sup>1</sup>Units are tons of product

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

|                    |                              |
|--------------------|------------------------------|
| TETRAETHYL LEAD    |                              |
| 3-01-167-99        | OTHER/NOT CLASFD             |
| TETRAHYDROFURAN    |                              |
| 3-01-168-99        | OTHER/NOT CLASFD             |
| TRICHLOROETHYLENE  |                              |
| 3-01-169-99        | OTHER/NOT CLASFD             |
| TRIMETHYLOLPROPANE |                              |
| 3-01-170-99        | OTHER/NOT CLASFD             |
| VINYL ACETATE      |                              |
| 3-01-171-01        | VIA ACETYLENE                |
| -10                | VIA ETHYLENE                 |
| -99                | OTHER/NOT CLASFD             |
| ALCOHOLS           |                              |
| 3-01-172-01        | ALLYL                        |
| -05                | ETHYL                        |
| -10                | ISOBUTYL                     |
| -15                | ISOPROPYL                    |
| -20                | METHYL                       |
| -25                | NBUTYL                       |
| -30                | SECBUTYL                     |
| -35                | TERTBUTYL                    |
| -99                | OTHER/NOT CLASFD             |
| GLYCOLS            |                              |
| 3-01-173-01        | ETHYLENE                     |
| -05                | 1,3 BUTYLENE                 |
| -10                | PROPYLENE                    |
| -99                | OTHER NOT CLASFD             |
| ETHERS             |                              |
| 3-01-174-01        | DIETHYL                      |
| -05                | DIISOPROPYL                  |
| -10                | 1,4 DIOXANE                  |
| -15                | DIPROPYL                     |
| -20                | METHYL PROPYL                |
| -99                | OTHER NOT CLASFD             |
| CHLORO METHANES    |                              |
| 3-01-175-01        | METHYL CHLORIDE              |
| -05                | METHYLENE CHLORIDE           |
| -10                | CARBON TETRACHLORIDE         |
| -15                | CHLOROFORM                   |
| -99                | OTHER NOT CLASFD             |
| NITRILES           |                              |
| 3-01-176-01        | ACETONITRILE                 |
| -10                | ACRYLONITRILE                |
| -15                | ADIPONITRILE/VIA ADIPIC ACID |
| -20                | ADIPONITRILE/VIA BUTADIENE   |
| -25                | METHACRYLONITRILE            |
| -99                | OTHER NOT CLASFD             |

<sup>1</sup>Units are tons of product

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

CHLORIDES

|             |                  |
|-------------|------------------|
| 3-01-177-01 | ALLYL CHLORIDE   |
| -05         | ETHYL CHLORIDE   |
| -10         | NBUTYL CHLORIDE  |
| -15         | VINYL CHLORIDE   |
| -99         | OTHER/NOT CLASFD |

<sup>1</sup> Units are tons of product

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

INDUSTRIAL PROCESS - PRIMARY METALS

ALUMINUM ORE - ELECTRO REDUC

- 3-03-001-06 INGOT CASTING/ALLOY<sup>2</sup>
- 07 ALUMINUM FLUORIDE RECOV
- 08 CRYOLITE RECOV

IRON PRODUCTION

- 3-03-008-09 INGOT CASTING<sup>2</sup>

MAGNESIUM - ELECTROLYTIC

- 3-03-035-01 MAGNESIUM OXIDE KILN
- 03 MAGNESIUM CHLORIDE DRYER
- 05 MAGNESIUM CASTING/ALLOYING<sup>2</sup>
- 99 OTHER/NOT CLASFD

<sup>1</sup> Units are tons of product

<sup>2</sup> Units are tons of metal

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

INDUSTRIAL PROCESS -NATURAL GAS IND.  
COMPRESSION

3-01-001-01 BLOWDOWN  
-02 SEALS

DEHYDRATION

3-10-002-01 DRYING/ETHYLENE GLY  
-02 DRYING/OTHER  
-10 REFRIGERATION  
-20 ADSORPTION

GAS DESULFURIZATION

3-10-002-01 MEA PROC W/FLARE  
-02 MEA PROC W/INCIN  
-99 OTHER/NOT CLASFD

NATURAL GAS LIQUIDS<sup>2</sup>

3-10-004-01 REFRIGERATION  
-02 ABSORPTION  
-03 FRACTIONATION  
-04 ADSORPTION

FLARES/INCINERATION<sup>3</sup>

3-10-005-01 WASTE GAS

<sup>1</sup> Units are million cubic feet processed

<sup>2</sup> Units are 1000 gallons of product

<sup>3</sup> Units are million cubic feet

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

| POINT SC EVAP       | - PETROL PROD STG       |
|---------------------|-------------------------|
| FIXED ROOF          |                         |
| 4-03-001-30         | BREATH-GASO #           |
| -31                 | BREATH-CRUDE #          |
| -32                 | BREATH-JP-4 #           |
| -33                 | BREATH-JET KERO #       |
| -34                 | BREATH-DIST NO. 2 #     |
| -35                 | BREATH-REID NO. 6 #     |
| -40                 | BREATH-GASO *           |
| -41                 | BREATH-CRUDE *          |
| -42                 | BREATH-JP-4 *           |
| -43                 | BREATH-JET KERO *       |
| -44                 | BREATH-DIST NO. 2 *     |
| -45                 | BREATH-RESID NO. 6 *    |
| -70                 | WORK-JP-4               |
| -71                 | WORK-JET KERO           |
| -72                 | WORK-DIST NO. 2         |
| -73                 | WORK-RESID NO. 6        |
| FLOATING ROOF       |                         |
| 4-03-002-30         | STAND STG-GASO #        |
| -31                 | STAND STG-CRUDE #       |
| -32                 | STAND STG-JP-4 #        |
| -33                 | STAND STG-JET KERO #    |
| -34                 | STAND STG-DIST NO. 2 #  |
| -35                 | STAND STG-RESID NO. 6 # |
| -40                 | STAND STG-GASO *        |
| -41                 | STAND STG-CRUDE *       |
| -42                 | STAND STG-JP-4 *        |
| -43                 | STAND STG-JET KERO *    |
| -44                 | STAND STG-DIST. NO. 2 * |
| -45                 | STAND STG-RESID NO. 6 * |
| -70                 | WORKING-GASO #          |
| -80                 | WORKING-GASO *          |
| # - TANK CAPACITY < | 100,000 BBL             |
| * - tank capacity > | 1000,000 bbl            |

<sup>1</sup> Units are 1,000 gallons of storage capacity for breathing and standing storage losses and 1,000 gallons of throughput for working losses.

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

POINT SOURCE EVAPORATION - PETROCHEMICAL STORAGE  
FIXED ROOF

|                  |                         |
|------------------|-------------------------|
| 4-04-002-13      | METHYL ACRYLATE         |
| -14              | METHYL METHACRYLATE     |
| -18              | TETRAHYDROFURAN         |
| -19              | VINYL ACETATE           |
| -25              | NBUTYL CHLORIDE         |
| -26              | ETHYLENE DICHLORIDE     |
| -27              | METHACRYLONITRILE       |
| -28              | METHYL ALCOHOL          |
| -29              | METHYLCYCLOPENTANE      |
| -30              | METHYL ETHYL KETONE     |
| -31              | ISOPROPYL ALCOHOL       |
| -32              | 1, 1, 1-TRICHLOROETHANE |
| -99              | OTHER/NOT CLASFD        |
| OTHER/NOT CLASFD |                         |
| 4-04-999-99      | SPECIFY IN REMARKS      |

<sup>1</sup> Units are 1,000 gallons of storage capacity.

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

POINT SOURCE EVAPORATION - PETROL MRKT TRANS  
TANK CARS/TRUCKS

|             |                           |
|-------------|---------------------------|
| 4-06-001-40 | LD-SUBMR-NORM GASO        |
| -41         | LD-SUBMR-NORM CRUDE       |
| -42         | LD-SUBMR-NORM JP-4        |
| -43         | LD-SUBMR-NORM JET KERO    |
| -44         | LD-SUBMR-NORM DIST NO. 2  |
| -45         | LD-SUBMR-NORM RESID NO. 6 |
| -60         | LD-SPLSH-NORM GASOLINE    |
| -61         | LD-SPLSH-NORM CRUDE       |
| -62         | LD-SPLSH-NORM JP-4        |
| -63         | LD-SPLSH-NORM JET KERO    |
| -64         | LD-SPLSH-NORM DIST NO. 2  |
| -65         | LD-SPLSH-NORM RESID NO. 6 |
| -70         | LD-SUBMRG-BAL GASOLINE    |
| -71         | LD-SUBMRG-BAL CRUDE       |
| -72         | LD-SUBMRG-BAL JP-4        |
| -73         | LD-SUBMRG-BAL JET KERO    |
| -74         | LD-SUBMRG-BAL DIST NO. 2  |
| -75         | LD-SUBMRG-BAL RESID NO. 6 |
| -80         | LD-SPLSH-BAL GASOLINE     |
| -81         | LD-SPLSH-BAL CRUDE        |
| -82         | LD-SPLSH-BAL JP-4         |
| -83         | LD-SPLSH-BAL JET KERO     |
| -84         | LD-SPLSH-BAL DIST NO. 2   |
| -85         | LD-SPLSH-BAL RESID NO. 6  |

MARINE VESSELS

|             |                     |
|-------------|---------------------|
| 4-06-002-06 | LOADING JP-4        |
| -07         | LOADING JET KERO    |
| -08         | LOADING DIST. NO. 2 |
| -09         | LOADING RESID NO. 6 |
| -10         | LD CLEAN SHIP/GASO  |
| -11         | LD DIRTY SHIP/GASO  |
| -12         | LD CLEAN BARG/GASO  |
| -13         | LD DIRTY BARG/GASO  |

<sup>1</sup> Units are 1,000 gallons transferred.

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRAN  
TANK CARS/TRUCKS - LOAD

|             |                            |
|-------------|----------------------------|
| 4-10-001-01 | ACETALDEHYDE               |
| -02         | ACETONITRILE               |
| -03         | ACRYLONITRILE              |
| -04         | BUTADIENE (TC)             |
| -05         | CARBON TETRACHLORIDE       |
| -06         | CHLOROFORM                 |
| -07         | DICHLOROETHANE (TC)        |
| -09         | DIETHYLAMINE (TC)          |
| -11         | ETHYLENE OXIDE (TC)        |
| -12         | ISOPRENE                   |
| -13         | METHYL ACRYLATE            |
| -14         | METHYL METHACRYLATE (TC)   |
| -16         | NPROPYLAMINE (TC)          |
| -17         | PROPYLENE OXIDE            |
| -18         | TETRAHYDROFURAN            |
| -19         | VINYL ACETATE              |
| -20         | VINYL CHLORIDE (TC)        |
| -21         | VINYLLINDENE CHLORIDE (TC) |
| -99         | OTHER/NOT CLASFD           |

<sup>1</sup> Units are 1,000 gallons transferred.

TABLE II-3  
SOURCE CLASSIFICATION CODES (SCC)  
RECOMMENDED FOR ADOPTION<sup>1</sup> (CONTD)

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRANSPORT  
MARINE VESSALS - LOAD

|             |                     |
|-------------|---------------------|
| 4-10-005-01 | ACETALDEHYDE        |
| -02         | ACETRONITRILE       |
| -04         | BUTADIENE           |
| -07         | DICHLOROETHANE      |
| -08         | DIETHYL ETHER       |
| -10         | ETHYLENE            |
| -11         | ETHYLENE OXIDE      |
| -13         | METHYL ACRYLATE     |
| -14         | METHYL METHACRYLATE |
| -15         | PROPIONALDEHYDE     |
| -17         | PROPYLENE OXIDE     |
| -19         | VINYL ACETATE       |
| -20         | VINYL CHLORIDE      |
| -21         | VINYLDENE CHLORIDE  |
| -99         | OTHER/NOR CLASFD    |

<sup>1</sup> Units are 1,000 gallons transferred.

TABLE II-4

CROSS REFERENCE TABLE FOR CHEMICALS NORMALLY  
IDENTIFIED BY TRADE NAMES

| TRADE<br>NAME | CHEMICAL NAME                                                                                                                                | SUGGESTED SCC <sup>(1)</sup> |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Cellosolves   | Ethylene Glycol Ethers                                                                                                                       | 3-01-174-99                  |
| Hydan         | Hydroxymethionine<br>(Used in the production of<br>Methyionine an amino acid)                                                                | 3-01-999-99                  |
| Hypalon       | Chlorosulfonated Polyethylene<br>(A vulcanizable elastomer or<br>specialty rubber)                                                           | 3-01-026-99                  |
| Voranol R     | Polyether Glycols<br>(An intermediate in the<br>manufacture of rigid urethane<br>foam. There are two other<br>classes of Voranols: CP and P) | 3-01-173-99                  |
| Triton        | Specialty Cleaning Agents<br>(There are 20 different types<br>of Triton <sup>(R)</sup> )                                                     | 3-01-009-99                  |

(1) In the comments field on NEDS Card 6, the specific chemical name or variation of the trade name should be as specified, e.g., hydroxymethionine, Triton CF-54, Voranol P, etc.

can refer to various fluorocarbon compounds. The proposed code designation for dimethyl terephthalate plus terephthalic acid should be changed to dimethyl terephthalate to avoid confusion with the existing code for terephthalic acid. Although some processes produce both chemicals together, most processes produce one or the other alone.

5. Six compounds should be exempted from being grouped according to chemical class: aniline; tetrahydrofuran; pentaerythritol; cyclohexanol; cyclohexanone; and 1,6 hexanediol. These compounds should each be given separate codes.
6. A table (see Table II-5) cross-referencing common chemical names with the nomenclature used in the SCC master list should be provided to NEDS users. This table should aid users greatly in locating compounds for which there are more than one common name.
7. Although none of the proposed codes had a process description of "other/not classified, i.e., ending in 99", a substantial number were described as "general". All such codes which cannot be included in a chemical class should be redesignated as "other/not classified" and given a code ending in "99". Such a designation requires the coder to make a comment on NEDS Card 6 before the data can be processed into NEDS. These comments may be useful at a later date in defining more specific codes.

#### Plastic Fabrication

TACB proposed 15 new codes dealing with the fabrication of plastics. These proposed codes were to be included in a Category II series separate from the chemical manufacturing series. Most of the proposed codes had a "general" designation. It is recommended that these codes be included in the present plastics group under chemical manufacturing. Thus, all codes dealing with resin manufacturing and plastic fabrication could be found in one section. Fewer 99 codes would be created, and users would be less likely to select 99 codes because the other codes could be more easily found. Under chemical

TABLE II-5  
CHEMICAL NAME CROSS REFERENCE TABLE

| CHEMICAL NAMES            | NAME AS APPEARING IN SCC LIST |
|---------------------------|-------------------------------|
| Diethylenediamine         | Ethyleneamine                 |
| Piperazidine              |                               |
| Piperazine                |                               |
| Ethylene Chloride         | 1, 2 Dichloroethane           |
| Ethylene Dichloride       |                               |
| Ethylidene Chloride       | 1, 1 Dichloroethane           |
| Ethylidene Dichloride     |                               |
| Vinylidene Chloride       | 1, 1 Dichloroethene           |
| Pimelin Ketone            | Cyclohexanone                 |
| 1, 2 Epoxyethane          | Ethylene Oxide                |
| Hexamethylene Glycol      | 1, 6 Hexanediol               |
| Hydrocyanic Acid          | Hydrogen Cyanide              |
| Formonitrile              |                               |
| Prussic Acid              |                               |
| $\alpha$ -Trichloroethane | Methyl Chloroform             |
| 1, 1, 1 Trichloroethane   |                               |
| Hexahydrotoluene          | Methyl Cyclohexane            |
| Ethene                    | Ethylene                      |
| Propene                   | Propylene                     |
| Methyl Ethylene           |                               |
| Butene                    | Butylene                      |
| Tetrachloroethylene       | Perchloroethylene             |
| Tetramethylol Methane     | Pentaerythritol               |
| Carbolic Acid             | Phenol                        |
| Benzenol                  |                               |
| Hydroxybenzene            |                               |

TABLE II-5 (CONT'D.)

CHEMICAL NAME CROSS REFERENCE TABLE

| CHEMICAL NAMES       | NAME AS APPEARING IN SCC LIST |
|----------------------|-------------------------------|
| Ethenyl Benzene      | Styrene                       |
| Phenylethylene       |                               |
| Vinylbenzene         |                               |
| Butylene Oxide       | Tetrahydrofuran               |
| Diethylene Oxide     |                               |
| Tetramethylene Oxide |                               |
| 1,4 Epoxy Butane     |                               |
| Ethylene Trichloride | Trichloroethylene             |
| 2-Propanol           | Isopropyl Alcohol             |
| Ethyl Ether          | Diethyl Ether                 |
| Ethyl Oxide          |                               |
| Ethylic Ether        |                               |
| Isopropyl Ether      | Diisopropyl Ether             |
| Chloromethane        | Methyl Chloride               |
| Dichloromethane      | Methylene Chloride            |
| Tetrachloromethane   | Carbon Tetrachloride          |
| Trichloromethane     | Chloroform                    |
| Ethane Nitrile       | Acetonitrile                  |
| Methyl Cyanide       |                               |
| Vinyl Cyanide        | Acrylonitrile                 |
| 3-Chloropropene      | Allyl Chloride                |
| Chloroethane         | Ethyl Chloride                |
| Hydrochloric Ether   |                               |
| Monochloroethane     |                               |
| Muriatic Ether       |                               |
| Chloroethene         | Vinyl Chloride                |
| Chloroethylene       |                               |

manufacturing, TACB proposed codes for the manufacture of five resins (including high and low density polyethylene). These codes should be added to the list except for the general code for polypropylene manufacture for which a code already exists. Codes should be created for the fabrication of those resins for which a manufacturing code exists or is proposed.

#### Primary Metals Industry

It is recommended that the codes proposed by TACB be adopted with the following exceptions:

1. Codes proposed for manufacturing alumina and iron ore calcining should not be adopted because there are existing codes for these processes.
2. The designation of the codes proposed for aluminum fluoride and cryolite manufacture should be changed to recover because these processes recover aluminum fluoride and cryolite rather than manufacture these compounds.
3. The proposed codes for magnesium chloride neutralizers and cells should not be included in the SCC table. The toxic nature of the raw materials and products of these processes requires that good engineering practice be used at all times, so that emissions are strictly controlled. In fact, the cells are sealed systems and, thus, have no emissions.

#### Natural Gas Industry

It is recommended that 14 new codes be adopted to cover sources in the natural gas industry. These codes are the same as those proposed by TACB with the following exceptions:

1. The designation of a code for fugitive losses from the compression process should be redesignated as emissions from seals in order to more accurately identify the source of emissions.

2. Four codes should be added for dehydration to reflect the four processes used, i.e., drying/ethylene glycol, drying/other, refrigeration, and absorption. The proposed 99 code is not recommended.
3. The designation gas sweetening proposed by TACB should be changed to desulfurization.
4. Because a code has been proposed for each of the processes used in natural gas liquid by-product recovery, no 99 (other/not classified) code is recommended for this process.

#### Cleaning Solvents

None of the 23 codes proposed by TACB to cover surface wiping should be approved at this time. If the wiping operation is involved in the degreasing process, new codes could be added to that series. However, if surface wiping is an operation in another process, such as paint stripping, codes specifically identifying such an operation should be added at a later date.

#### Petroleum Product Storage

TACB proposed new codes for breathing and working losses from fixed roof storage tanks and for standing storage losses from floating roof tanks for five petroleum products: (1) liquified petroleum gas (LPG), (2) naphtha (3) reformate, (4) alkylate, and (5) gas oil. Radian included these TACB codes in its list of proposed codes without change. None of the proposed codes for these five petroleum products should be adopted for the following reasons:

- o Because LPG is normally stored in pressure vessels under an inert gas blanket, emissions are not considered to be significant. (Only fixed roof working and breathing codes were proposed for LPG storage.)
- o The term "naphtha" also refers to light oil products (solvents) and could cause confusion with petrochemical storage codes that might be adopted later. Normally naphthas have boiling points

ranging between gasoline and kerosene. Industry should be surveyed to determine normal storage methods for these products.

- o Reformate is a broad term used to identify products from the thermal or catalytic reforming processes which are used to increase the octane number of gasoline. SCCs already exist for gasoline and other typical products of the reforming process such as toluene.
- o Alkylation is a refinery process for chemically combining isoparaffins with olefin hydrocarbons. Codes already exist for specific alkylates such as isooctane.
- o Gas oils are petroleum distillates such as kerosine, diesel fuel, heating oils, and light fuel oils with boiling points within the 232-426°C range. The inclusion of these proposed codes in the master list could cause double counting or the inclusion of the same emissions in NEDS twice because more detailed codes for this class of petroleum products exist or may be adopted in the future.

In addition to incorporating the TACB codes discussed above, Radian proposed substantial changes to the existing codes for fixed roof, floating roof, and variable vapor space storage tanks. Radian's proposed changes, a total of 92 codes (48 for fixed roof tanks, 29 for floating roof tanks, and 15 for variable vapor space tanks), were made to replace the existing 61 codes (30 for fixed roof, 17 for floating roof, and 14 for variable vapor space). With the exceptions noted above, most of the new codes (see Table II-3) should be adopted in a format similar to the one proposed by Radian, albeit with certain changes in the Category IV codes to reduce confusion. There are some important precautions that must be taken, however. Code designations should not be lightly changed. Sources which emit thousands of tons of hydrocarbons have been coded into NEDS already, using the old codes. Were all of these sources to be recoded, the effort could take years. If a code is poorly delineated, it should be dropped from the listing so that its use can be discontinued. It should be recognized, however, that there has been considerable recent interest in verifying the adequacy of emission factors for losses from fixed and floating roof tanks. A number of on-going

studies for industry and government evidence this interest.<sup>(1)</sup> And, although the emission factors Radian proposed were not reviewed, these new data should be reviewed by EPA and incorporated into AP-42 and the SCC master list. To reduce the likelihood that coders will use incorrect codes, a guideline document to more fully explain how to use the codes is needed. In these guidelines the following points should be emphasized:

- For fixed roof tanks, "working losses" include both filling and emptying losses.
- In the comments for the Category IV codes 98/99, the coder should specify both the liquid stored and the tank capacity. These comments should be standardized.
- A distinction should be drawn between the old general codes such as 4-03-001-01, "breathing-gasoline", and new more specific codes such as 4-03-001-30, "breathing-gasoline <100,000 bbls", so that a coder will be able to determine which one to use.
- The terminology used to describe petroleum products should be defined. These explanations should eliminate some of the confusion that may arise from adopting codes specifically for such products as JP-4, No. 2 distillate, or No. 6 residual.
- Spheres and other pressurized tanks are not included as fixed roofs.
- The differences between floating roof and variable vapor space tanks should be explained and examples given of each major type.
- Wetting losses (working losses from floating roof tanks caused by the exposure of a wetted wall to the atmosphere) are usually negligible. If a source has considerable wetting losses, the 99 code should be used and a comment noting that the source has substantial wetting losses should be made.

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(1) The American Petroleum Institute is currently sponsoring a source testing study to determine emission factors for losses from storage tanks.

### Petroleum Product Marketing/Transportation

There are presently four series of Category III codes for petroleum product marketing/transportation, i.e., tank cars/trucks, marine vessels, underground gasoline storage, and filling vehicle gasoline tanks. TACB proposed no new codes for these sources. Radian did not propose new codes for underground gasoline storage or filling vehicle gasoline tanks although they did propose modified emission factors for the latter series. Radian proposed 25 new codes covering the loading of tank cars/trucks to replace the existing 18 SCCs which cover loading and unloading operations. The existing 12 codes for loading and unloading marine vessels were to be replaced by a new series covering loading and transit operations. Each of these new proposed series represents a significant departure from the existing codes.

For the tank car/truck loading series, Radian proposed a format for code designation which differentiates between loading methods, i.e., splash and submerged, and types of "carrier service", i.e., normal and balance.<sup>(1)</sup> A cargo carrier in normal dedicated service transports only one product. Inasmuch as the carrier tank is not cleaned or vented between trips, the empty tank retains a significant concentration of vapors generated by the evaporation of product retained on the tank surfaces. These vapors are emitted during a subsequent loading operation along with any new vapors that may be generated. On the other hand, a cargo carrier in dedicated balance service accumulates vapors displaced during unloading operations and transports these vapors back to the truck loading terminal. Thus, a cargo carrier in dedicated balance service normally contains hydrocarbon saturated vapors. It is recommended that the following actions be taken on these proposed tank car/truck codes:

1. The new codes should not replace the existing codes but should be incorporated in a format consistent with the present designations. Too much effort would be needed to recode the existing inventory if the codes were replaced.
2. Some explanation of the new codes will be necessary because often they are much more specific than the old ones. For

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(1) Balance refers to a loading system which returns the displaced vapors to the loading vessel, thus avoiding any emission to the air.

example, some of the new codes refer to "JP-4" rather than "jet fuel". Some distinction must be drawn so that a coder may know when and how to use the new codes.

3. The existing 99 code should be retained. Standardized comments should be developed for this code so that a distinction between balance and normal carrier service could be drawn.

With the adoption of these codes, the unused numbers available in the master list for codes dealing with unloading operations is rather limited. Thus, the ability to create new unloading codes is being restricted.

For the marine vessels series, Radian made a distinction between loading clean ships and barges with gasoline and loading dirty ships and barges with gasoline. For each of the other petroleum products considered, i.e., crude oil, JP-4, jet kerosene, No. 2 distillate oil, and No. 6 residual oil, Radian proposed a code designated "loading general". A separate transit code was proposed for each of the six products. It is recommended that the following actions be taken on these proposed codes:

1. The existing codes should not be deleted because of the extensive effort that would be necessary for recoding.
2. The transit codes should not be adopted because emissions during transit are area source emissions, which are not included under SCCs.
3. The remaining codes should be incorporated into the master list except for the one for loading crude oil because there is an existing code for this product.
4. In the guideline document, the term "loading general" should be defined. A clear distinction should be drawn also between the old and the new codes so that a coder can readily determine which one to use.

#### Petrochemical Product Storage

TACB proposed two series of codes, i.e., one for breathing losses and another for working losses, for emissions from the storage of 61 petro-

chemicals in fixed roof tanks. Radian developed emission factors for 15 of these petrochemicals. Codes should be adopted for twelve petrochemicals: n-butyl chloride; ethylene chloride; methacrylonitrile; methyl acrylate; methyl alcohol; methyl cyclopentane; methyl ethyl ketone; methyl methacrylate; isopropyl alcohol; tetrahydrofuran; 1, 1, 1 trichloroethane; and vinyl acetate. No distinction should be made in the code listing between breathing and working losses. These petrochemicals are costly products; they are often toxic, corrosive, flammable, reactive or volatile or are an irritant, and are marketed on the basis of concentration and quality or reagent grade. Therefore, one would expect that vapor control devices would be commonly used to minimize emissions. To differentiate between breathing and working losses may not be as important as to distinguish between controlled and uncontrolled sources. Coders should be asked to use the 99 code to identify breathing losses if they exist, and use the specific code for working losses. Other recommendations include:

1. Qualifying criteria should be developed to identify petrochemicals for which storage codes should be developed. In this effort, criteria were developed to identify petrochemicals which would have a limited emission potential when stored. A better approach would be to establish criteria which would identify petrochemicals with a high emission potential when stored.
2. There is little information on the storage of petrochemicals. EPA should undertake a comprehensive investigation and documentation of industrial petrochemical storage practices.
3. A guideline document is needed to briefly explain the use of each code in the master list. For these petrochemical storage codes, a coder should be asked to identify working pressures, control devices, type of tank, and the chemical stored. To facilitate future code development, standard comments including abbreviations should be developed to systematize the information given for the 99 code. Such comments could take the following format: Type of tank - chemical stored - working pressure - control device.

4. All sources presently coded using "Miscellaneous Organic Storage - Other/Not Classified" (4-04-001-99) should be re-coded using these new codes for petrochemical storage.
5. The adoption of these codes should be considered experimental because it is not clear at this time how much, if any, benefit will be derived from their inclusion in the master list. One cannot determine at this time what type of hydrocarbon data EPA needs in the NEDS data base to successfully complete future hydrocarbon studies. All of the compounds for which codes were developed have boiling points higher than 60°C at 760 mm Hg and have been identified as irritants or as causing narcosis. Thus, it is questionable whether the storage of these petrochemicals is an appreciable air pollution source.

The following categories of petrochemicals were eliminated from the list:

1. Organic chemicals with an absolute vapor pressure less than 1.5 psia at 70°F. Emissions from these categories should be grouped together. There is no technology currently available to control emissions from these sources. Such organics were considered to have too low an emission potential.
2. Those compounds with a boiling point below 25°C at 760 mm Hg. Normally, any compounds with such a low boiling point would be stored in pressure vessels or refrigerated tanks.
3. Any petrochemical with a boiling point below 60°C at 760 mm Hg. These chemicals would probably be stored under working pressures that would preclude any emissions. In most cases these compounds have been also identified as health hazards and, thus, cannot be emitted to the atmosphere.
4. All compounds known to be health hazards. The toxic nature of these chemicals would necessitate the prevention of any atmospheric emissions.

Some of these chemicals are so reactive that they must be stored in tanks which protect them from oxygen and/or atmospheric moisture. Table II-6 lists each compound eliminated using these criteria and which criterion caused the

TABLE II-6

PETROCHEMICALS NOT INCLUDED IN THE  
MASTER LIST<sup>(1)</sup>

| ABSOLUTE VAPOR<br>PRESSURE<br>< 1.5 psia @ 70°F | BOILING POINT<br>BELOW<br>25°C @ 760 mm Hg | BOILING POINT<br>BELOW<br>60°C @ 760 mm Hg | TOXICITY             |
|-------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------|
| Acetic Acid                                     | Acetaldehyde                               | Allyl Chloride                             | Acetonitrile         |
| Acetic Anhydride                                | Butadiene                                  | Diethyl Ether <sup>(2)</sup>               | Acrylonitrile        |
| Allyl Alcohol                                   | Ethylene                                   | Isoprene <sup>(2)</sup>                    | Carbon Tetrachloride |
| Sec Butyl Alcohol                               | Ethylene Oxide                             | Methylene Chloride <sup>(2)</sup>          | Chloroform           |
| Iso Butyl Alcohol                               | Vinyl Chloride                             | Propionaldehyde <sup>(2)</sup>             | Diisopropyl Ether    |
| Tert Butyl Alcohol                              | Freon 11                                   | Methyl Propyl Ether <sup>(2)</sup>         | Dipropyl Ether       |
| Cumene                                          |                                            | n-Propylamine                              | Trichloropropylene   |
| Cyclohexane                                     |                                            | Propylene Oxide                            | Trichloroethylene    |
| 1, 4 Dioxane                                    |                                            | Vinylidene Chloride                        |                      |
| Ethyl Benzene                                   |                                            | Acetone                                    |                      |
| Ethyl Acetate                                   |                                            | Chloroprene                                |                      |
| Methylcyclohexane                               |                                            | Diethylamine                               |                      |
| Nitromethane                                    |                                            | Methyl Acetate                             |                      |
| Phenol                                          |                                            |                                            |                      |
| Styrene                                         |                                            |                                            |                      |
| Xylene                                          |                                            |                                            |                      |

(1) The table shows those chemical compounds suggested by TACB and Radian which were not included in the SCC master list because the vapor pressure, boiling point or toxicity would preclude the storage of these compounds in this fashion.

(2) These chemicals are so reactive that they must be stored in tanks which eliminate exposure to atmospheric moisture and/or oxygen.

elimination. The following changes in nomenclature and deletions were also necessary:

- o Ethyl alcohol was eliminated because its value as a chemical and strict government regulations pertaining to its production and marketing would tend to preclude emissions.
- o Because there was not enough data to characterize the storage of isocyanates, they were deleted from the list.
- o TACB proposed petrochemical product storage codes for "dichloroethane" and "1, 2-ethylene dichloride". There are two isomers of dichloroethane: 1, 1 dichloroethane and 1, 2 dichloroethane which is commonly known as ethylene dichloride. Ethylene dichloride was included in the list but 1, 1 dichloroethane was excluded because its boiling point is less than 60°C at 760 mm Hg.
- o Dichloropropane and dichloropropylene were eliminated because each nomenclature designates a group of isomers which have differing characteristics.

TACB also proposed floating roof standing storage codes for the 61 petrochemicals for which they proposed fixed roof working and breathing loss codes. Radian developed emission factors for 15 of these compounds and also proposed variable vapor space storage tank codes for the same 15 chemicals. None of these codes should be adopted at this time because there is not sufficient evidence to indicate that any of these chemicals are actually stored in floating roof and variable vapor space tanks. Indeed, there are good reasons for suspecting that they are not. Because most of these petrochemicals are toxic or are rather costly products, most are probably stored under sufficient working pressures to minimize emissions. EPA should survey industry to determine which storage methods are used for these common petrochemicals, what typical working pressures are normally applied, and what type of control devices are in common usage.

#### Petrochemical Marketing/Transportation

TACB proposed codes for each of 51 petrochemicals to cover five different marketing/transportation operations: (1) tank cars/trucks-splash

loading, (2) tank cars/trucks-submerged loading, (3) tank cars/trucks-unloading, (4) marine vessel loading, and (5) marine vessel unloading. Radian did not propose any codes for petrochemical marketing/transportation. The adoption of codes for 18 of these petrochemicals for tank cars/trucks-loading and marine vessel-loading is recommended. The series for tank cars/trucks-loading should not be divided into separate series for splash loading and submerged loading because the distinction between loading methods may not be significant. Most of these chemicals are sufficiently toxic or valuable that one would reasonably expect industry to employ some form of air pollution control to minimize losses to the atmosphere. Thus, the distinction between controlled and uncontrolled emissions may be more important. The proposed codes for tank cars/trucks-unloading and marine vessels-unloading are not recommended, either, because unloading losses are best handled as storage tank working losses. For the series that are recommended, only those petrochemicals are listed for which the recommended mode of transportation could be identified. In some cases, "TC" is used to identify those products which are normally shipped only in tank cars. However, EPA should survey industry to determine the transportation mode commonly used for each of the originally listed petrochemicals as well as any others that may be of interest.

#### Review Methodology

It is incumbent upon the National Air Data Branch (NADB) to review all proposed codes and to determine whether the proposed additions/changes are necessary. NADB has established general guidelines which apply to all proposed SCC revisions. SCCs may be added for new emission categories incorporated into AP-42 if there are no existing specific SCCs and for existing source categories if none of the present specific SCCs are applicable. Other SCCs may be added to account for the use of in-process fuels, if such consideration has not been already made, or to make NEDS compatible with other data systems. SCCs may be expanded if a more sophisticated determination of emission factors for a process is possible. There are four methods for expanding codes and defining new emission factors:

1. As a function of process throughput;
2. As a function of variation in equipment;
3. As a function of operating mode; and,

4. For a specific sub-process within a given process.

These guidelines were used to review the codes proposed by TACB and Radian.

Because NADB's guidelines are general, more specific technical criteria were developed to enhance the guidelines. These six specific criteria were utilized to develop the recommendations discussed earlier:

1. Because the current SCC master list is rather lengthy, new codes should not be adopted unless (1) the process to be inventoried using the new SCC emits a criteria pollutant, (2) the new SCC identifies major sources of emissions (more than 100 tons/year), (3) the process is associated with a major industry and is not obsolete, and (4) a significant number of potential sources can be identified by the candidate SCC.
2. A code proposed for product storage/marketing should identify the product which can actually be stored in the designated manner. For example, some codes were proposed for petrochemical products to be stored in floating-roof tanks which could not possibly be so stored because of their low boiling points. To evaluate the appropriateness of proposed product storage/marketing codes, the physical/chemical properties for each product to be stored were reviewed: boiling point range, true vapor pressure, reactivity, toxicity, hazardous nature of the chemical, etc.
3. Because various systems of nomenclature are used for organic chemicals, the designation of the proposed SCC should be consistent with the nomenclature used in the existing table.
4. A proposed code should be in the same format as the existing codes.
5. A candidate code should not duplicate existing codes.
6. Because each SCC should be associated with an emission factor, the process units (the mass or volume quantity of process throughput or product) associated with a candidate code must correspond to the process parameter required by an emission factor. If no emission factor exists for a candidate code, the process data that is required should be reasonably available and should be adequate for estimating emissions when a factor is developed.

To aid in systematizing the evaluation of each candidate code, a summary similar to that presented in Figure II-1 was used. These summaries also serve to document the analysis of candidate codes.

#### SCCs IDENTIFIED AS "OTHER/NOT CLASSIFIED"

Because specific SCCs have not been defined for all polluting processes, the master list contains codes for processes labeled as "other/not classified" and end in 99. The high percentage of code 99 usage limits the usefulness of the SCC emissions report. The solution to this problem lies in the adoption of codes proposed by users such as TACB and Radian and in continuously reviewing the processes found in code 99 to identify those processes for which codes can be developed. Ten of these type 99 codes were reviewed as part of this effort.

#### Code Selection

Three criteria were used to select the ten codes which were reviewed:

- o Source emission ratio. The ratio of the annual average emissions for any one criteria pollutant to the number of sources in each code 99 was developed from summaries of data in the NEDS file.
- o NEDS Card 6 comments. Codes for which a large quantity of information was available from the comments field on Card 6 were considered most suitable for analysis.
- o Category of source. Priority was given to those codes associated with a major industry.

Table II-7 lists the ten codes selected for review and the number of NEDS records reviewed.

#### Results and Recommendations

Based upon a review of the NEDS records of ten common "other/not classified" SCCs, general observations and recommendations can be made:

1. Many of the records were incorrectly coded. Although the specific reason for miscoding sources varied in accordance with the specific other/not classified code used, there appeared to be a general need for EPA to identify the sources included in some of the codes. It is recommended that EPA publish a guideline document which will more specifically define the sources and operations included in SCCs.

Initiator \_\_\_\_\_ Agency \_\_\_\_\_

Date \_\_\_\_\_

| <u>PROPOSED SCC CATEGORY</u> | <u>DIGITS</u> | <u>NAME DESIGNATION</u> |
|------------------------------|---------------|-------------------------|
| SCC Category I               | _____         | _____                   |
| SCC Category II              | _____         | _____                   |
| SCC Category III             | _____         | _____                   |
| SCC Category IV              | _____         | _____                   |
| Units                        | _____         | _____                   |

| <u>PROPOSED EMISSION FACTORS</u> | <u>UNITS/SCC</u> |
|----------------------------------|------------------|
| Particulate                      | _____            |
| SO <sub>2</sub>                  | _____            |
| NO <sub>x</sub>                  | _____            |
| EC                               | _____            |
| CO                               | _____            |

| <u>PROCESS EMISSION SOURCE</u> | <u>POLLUTANTS EMITTED</u> |
|--------------------------------|---------------------------|
| _____                          | _____                     |
| _____                          | _____                     |
| _____                          | _____                     |
| _____                          | _____                     |

PROCESS DIAGRAM ENCLOSED \_\_\_\_\_ Yes \_\_\_\_\_ No

COMMENTS  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

REVIEW CONCURRENCE \_\_\_\_\_ Yes \_\_\_\_\_ No

REVIEWER \_\_\_\_\_

DATE \_\_\_\_\_

Figure II-1 SCC review form.

TABLE II-7

"OTHER/NOT CLASSIFIED" SCCs REVIEWED

| SOURCE CATEGORY                            | SCC         | NEDS<br>RECORDS<br>REVIEWED |
|--------------------------------------------|-------------|-----------------------------|
| Paint Manufacturing                        | 3-01-014-99 | 95                          |
| Plastics                                   | 3-01-018-99 | 326                         |
| H <sub>2</sub> SO <sub>4</sub> Contact     | 3-01-023-99 | 41                          |
| Chemical Manufacturing                     |             |                             |
| Waste Gas Flares                           | 3-01-900-99 | 161                         |
| Ferroalloy Open Furnace                    | 3-03-006-99 | 47                          |
| Petroleum Industrial Flares                | 3-06-009-99 | 81                          |
| Inprocess Fuel-Residual Oil <sup>(1)</sup> | 3-90-004-99 | 479                         |
| Inprocess Fuel-Process Gas <sup>(1)</sup>  | 3-90-007-99 | 197                         |
| Surface Coating                            | 4-02-999-99 | 2,623                       |
| Industrial Boiler                          |             |                             |
| Bituminous Coal                            | 1-02-002-99 | 112                         |

- (1) Even though the NEDS does not handle emissions separately for in-process fuel, there are a number of other uses for the fuel information. Therefore a definite need exists to improve the quality of that kind of data. Determining area source emissions from fuel usage depends on developing a complete fuel balance for a county. In these cases, accurate in-process fuel data are essential.

2. New codes should be developed in response to a definite need, i.e., there are a significant number of sources emitting a substantial amount of one of the criteria pollutants which the present codes inadequately handle. It is important, therefore to identify the number and the emission potential of sources which have been coded with 99 codes. The wide variety of comments used on NEDS Card 6 for code 99 made it difficult to identify the number of specific unit operations or processes that have been included in code 99 by coders. If EPA were to standardize the comments that a coder can use for code 99, the definition of specific SCCs in the

future would be facilitated. EPA's edit program could be more effectively used to summarize NEDS data for analysis prior to the development of new SCCs.

3. Because the records spanned a five-year period, it was difficult to determine the magnitude of annual emissions from sources that have been coded using these ten particular 99 codes. A continuing effort to update the NEDS data file will be essential if SCCs are going to be more accurately defined. These problems prevented the development of more specific codes as a result of this review.
4. The adoption of the codes recommended as a result of the review of TACB's and Radian's proposed codes will reduce the number of records coded with 99 SCCs. Such revision of the master list, however, will not eliminate all of the problems associated with code 99.
5. Because of the difficulties encountered, no new codes are proposed as a result of this analysis at this time.

For each of the ten 99 codes reviewed, certain specific steps are recommended that EPA can take to further the effort of reducing the number and importance of 99 codes. Most of the following specific recommendations amplify these general recommendations.

#### Paint Manufacturing (3-01-014-99)

Nearly half of the records reviewed for this 99 code were miscoded. Most of the mistakes in coding appeared to result from the inclusion of a code for pigment kilns (3-01-014-02) under pain manufacturing. It is recommended that this code be suppressed. The existing series of codes for inorganic pigments should be adequate to handle the records previously included under this SCC. About 6% of the records could not be analyzed because of missing comments or Standard Industrial Classifications (SICs). Most of the remaining records could be grouped into one of the following operations:

1. Material handling/grinders/loading-unloading operations;
2. Mixers/thinners/blenders;
3. Fugitive losses/water-base paint;

4. Fugitive losses/non-water-base paints;
5. Lacquer manufacturing; and,
6. Industrial coating manufacturing.

EPA should instruct coders to use standard descriptions for these six operations and any others that might be appropriate in making comments on NEDS Card 6. The first two operations listed were the most frequently occurring operations. The last two operations, i.e., lacquer and industrial coating manufacturing, belong properly to the "other/not classified" chemical manufacturing code (3-01-999-99). If EPA prepares a guideline document as recommended, brief explanations of those operations for which standardized comments are provided should be included.

#### Plastics (3-01-018-99)

A large number of the records (62%) for this code could not be adequately reviewed because there were no comments. Of the remainder, 11% will be included under new codes which were recommended as a result of the analysis of codes proposed by TACB and Radian. No new codes could be developed from an analysis of the remaining records because the comments were too vague. Coders should be asked to specify in their comments a fabrication method, the resin used in plastic fabrication, or the monomer or resin manufactured. To assist the coder, EPA could provide a reference table in the proposed guideline from which abbreviations could be selected for combinations of solvents, resins, and monomers, e.g., methyl methacrylate (monomer)/acrylic resin/solvent "X".

#### Sulfuric Acid Manufacturing - Contact Process (3-01-023-99)

There are two main problems that coders are encountering in coding sulfuric acid manufacturing sources:

1. All other sulfuric acid manufacturing codes are based on the conversion efficiency. Because the coders have no idea which unit operations are included in each SCC nor the degree of control and type of control equipment used, they are including under the 99 code such emission points as fugitive losses, acid mist, adsorbers, etc. which properly should be assigned specific codes.

2. Coders are using this 99 code for acid reclaiming sources and sources related to the production of raw materials such as elemental sulfur, spent acid, hydrogen sulfide, sulfide ores, and smelter gas which are used to produce sulfuric acid.

The recommended guideline document should incorporate a condensed version of the discussion of acid manufacturing found in AP-42, as well as a discussion of acid reclaiming and raw material production. Over 60% of the records reviewed could not be analyzed properly because of missing or incorrect SICs and/or comments.

#### Chemical Manufacturing Waste Gas Flares (3-01-900-99)

Two-thirds of the records reviewed were incorrectly coded. Flares used in oil and natural gas production and extraction and in the metallurgical industry were incorrectly coded using this SCC. Only 10% of the records indicated the substance being flared. It is recommended that standardized comments be established for the following types of waste gas streams:

- o Streams rich in sulfur, nitrogen, or carbon monoxide;
- o Streams which contain acids or toxic compounds;
- o Streams which contain solvents (the solvent should be specified);
- and,
- o Streams which contain chemicals in certain chemical classes such as ketones, aldehydes, etc.

The proposed guidelines, by identifying the proper SCCs for those types of flares, could eliminate the problem evidenced by the large number of incorrectly coded sources.

#### Petroleum Industry Flares (3-06-009-99)

It is important that a standardized comment be developed to identify waste gas streams rich in hydrogen sulfide acid gas, and mercaptan. Reference should be made to alternative names for these streams such as sour gas. Over one-quarter of the records reviewed referred to such waste streams. Other flares could be grouped in accordance with the type of fuel burned, i.e. clean fuels (hydrocarbons), chemical wastes, and process wastes. Unless EPA intends to create a series of codes for petrochemical manufacturing as part of the

petroleum manufacturing series, coders should be encouraged to use the SCC for chemical manufacturing waste gas flares for waste streams from petrochemical operations.

#### Surface Coating (4-02-999-99)

The main problem with the records reviewed for this 99 code was that the process or unit operation was identified in the comments rather than the type of surface coating such as primer, enamel, etc. This type of comment does not conform to the format established for the surface coating series. Approximately 20% of the records should be recoded because: (1) there are existing specific codes, (2) new specific codes have been developed, or (3) new codes are being developed. It is recommended that the proposed guidelines require the coder to specify the solvent used. Unit operations can be identified in the comments fields for existing specific codes. Some discussion of commonly used terms such as sealers, dyes, stains, glazes, and fillers should be presented so that this terminology can be related to the technical classifications used to define specific SCCs.

#### Bituminous Coal Industrial Boiler (1-02-002-99)

Nearly one-third of the records reviewed were improperly coded because the coder did not recognize that the existing specific codes can apply also to chain grates, traveling grates, and underfired stokers. One-third could not be analyzed because the comments were omitted. The comments for the remainder were not useful because they were too vague, e.g., "coal boilers". The proposed guidelines should emphasize the equality of various terms for the same basic piece of equipment. States should be encouraged to request more specific information about process equipment on permit application forms so that specific comments can be made on NEDS Card 6.

#### Ferroalloy Open Furnace (3-03-006-99)

Apparently, coders are having difficulty in correctly using this 99 code because the other codes in the series are designated for differing alloys, e.g., 50% FeSi, 75% FeSi, etc., rather than unit operations. Thus, a coder may not know that each of the codes in the series pertains solely to emissions from submerged-arc open type electric smelting furnaces. These are

reduction-type processes, and emissions from other unit operations such as crushing, charging, or raw material handling are not included under any of these SCCs. It is recommended that the existing SCC for screening be expanded to include crushing and other handling operations because nearly 35% of the records reviewed referred to such operations. Standardized comments should be developed for other ferroalloys such as chrome-silica, stainless steel, silicomanganese, and for certain miscellaneous operations such as slag disposal and tapping. Approximately 35% of the records could not be reviewed because there were no comments.

#### Inprocess Fuel - Process Gas (3-90-007-99)

Approximately 85% of the records reviewed were incorrectly coded because sources burning coke oven gas, blast furnace gas, natural gas, or solid waste had been coded using this code although other SCCs are more applicable. The remainder of the records could not be analyzed because the comments were missing. The guidelines which have been recommended could be useful in correcting some of these problems by clarifying the difference between a process gas and natural or liquified petroleum gas used in a process. Standardized comments could be developed to better identify the type of process gas burned. Because waste gas streams are often used for inprocess fuel, probably the comments should be similar to those developed for chemical manufacturing and petroleum industry flares. The use of this code to identify sources in the petroleum industry which may burn process gas and oil must be corrected. SCCs dealing with inprocess fuel have no associated emission factors. Thus, emissions are estimated using the factor associated with the inprocess fuel code's "parent" SCC. Before this SCC or any other SCC dealing with inprocess fuel is expanded, careful consideration must be given to the "parent" SCC, i.e., a manufacturing SCC (with which an emission factor is associated) that can be used to estimate emissions from inprocess fuel combustion as well as from the process itself. There must be a parent SCC for each inprocess fuel SCC.

#### Inprocess Fuel-Residual Oil (3-90-004-99)

Approximately 65% of the records could not be adequately reviewed because of blank or useless comments or missing SICs. A tenth of the records were apparently incorrectly coded because this code was used to identify

grain dryers, incinerators, glass furnaces, etc. There is a definite need for guidelines to clarify the use of this code and others in this series. The inprocess fuel codes for metal melting, food-drying/cooking/etc., feed/grain drying, lime kilns, kaolin kilns, perlite furnaces, glass furnaces, frit smelters, and asphalt drying are in particular need of definition. It is not clear whether metal melting includes open hearths, electric arc furnaces, etc. or just melting for molding and casting operations. No distinction is made for primary and secondary metal operations. An explanation should be provided for such operations as slab furnace, hot strip mill furnace, heat treating furnace, and annealing oven which are normally included in the basic casting and molding operations. The codes for food-drying/cooking and feed/grain drying should be defined in the guidelines so that a coder will know if such operations as wet corn milling/pulp drying and bagasse drying are included. Based upon the records reviewed, there appears to be some confusion among coders as to the relationships between limestone drying and lime kilns, between clay and kaolin, perlite and glass, frit and ceramics, etc. The proposed guidelines should also explain what processes are covered by the code for asphalt drying. Standardized comments should be identified in the guideline recommended document which can lead eventually to defining new SCCs. Coders should be required to identify process units. There are a number of processes which could be identified in these comments: ore roasting/drying; anode baking; ovens used for ornamental metal work; processes in the textile industry; dryers, kettles, heaters, stills, etc. used in the plastics and petrochemical industries; and drying operations for mineral products such as salt/asbestos that are not currently specified in this code series. Comments such as "residual oil" or "#6 oil" should not be used.

#### Methodology

The following steps were taken to review the records from each 99 code selected:

1. EPA extracted all the records for the SCC from the NEDS data bank. Each of these records were reviewed manually.
2. The comments for each SCC were summarized. Similar comments were grouped in the summary so that the number of sources which had the same or similar characteristics could be identified.

3. The SCCs were cross-checked with the SICs to determine if any process was incorrectly coded, considering the nature of business of a specific four-digit SIC. This review, in some cases, identified probable miscoding in that some of the sources coded with a specific 99 code belonged to SICs in which such sources would not be expected.
4. An effort was made to determine the total emissions which could be grouped according to specific comments and the emissions from representative sources within this group. Any new SCC developed should categorize a significant number of major sources, i.e., sources with potential emissions greater than 25 tons/year, with a substantial emission potential. This effort was unsuccessful because there was no common baseline year for much of the data.
5. After reviewing a number of records, a number of problems with the methodology were discovered. To solve these problems, a number of recommendations were identified which held promise of enabling EPA in the future to better identify new SCCs from records coded with code 99. One major recommendation was to provide standardized comments and abbreviations which could be selectively retrieved by computer. Once this recommendation was identified, the comments were again reviewed in order that standardized comments could be suggested.

This methodology which could be utilized for reviewing records to identify new more specific SCCs and thus minimize the number of sources with code 99, was developed from the rather general methodology for developing new SCCs found in the NEDS User's Manual.

#### GENERAL CONCLUSIONS AND RECOMMENDATIONS

A number of general conclusions can be drawn from this effort to evaluate codes proposed by TACB and Radian and to develop new codes from 10 specific codes 99:

1. There is considerable room in the SCC master list for the addition of new codes. The list of new codes recommended as a result of this evaluation is by no means exhaustive but it is based on the best

information available at this time. Indeed, many of the codes not recommended may prove in the future to have merit.

2. If the master list is to be updated, EPA needs to develop a better procedure than is currently available. State and local agencies as well as Government contractors must be involved in the process because they are the primary developers of data that are entered into NEDS. EPA, however, has a major responsibility in the process in that EPA must evaluate all proposed codes and make the final decision as to adoption or rejection of proposed codes. This process and each participant's role in it must be adequately defined and systematized.
3. The number of codes 99 and the emission potential of sources with such codes limit the effectiveness of NEDS. This problem cannot be fully resolved using EPA's anticipatory approach, i.e., anticipating major source categories and developing emission factors and SCCs for these source categories. The population of major air pollution sources is too large and complex to rely solely on such an approach.
4. A significant problem identified during the review of codes 99 was the large number of sources which were coded with apparently incorrect SCCs. EPA should seriously consider further steps that can be taken to eliminate this problem.
5. The present state of the NEDS file is such that it is difficult to identify new SCCs by reviewing the records of sources with codes 99. Some recommendations have been made in the review of codes 99 and expanded upon in the discussion of the 10 specific codes which could make this file more useful.

It must be stressed that this effort may prove to be more useful because of the general recommendations made to enhance EPA's method of identifying and evaluating new SCCs rather than for the specific new SCCs recommended for adoption.

A major recommendation, however, is that the new SCCs recommended in Table II-3 be adopted expeditiously. Their adoption could prove to have immediate benefit both for EPA and NEDS users. In the long term, EPA should continually review SCCs for such industries as chemical manufacturing because of the technological changes that characterize these industries. Care must be taken to avoid encumbering the SCC master list with revisions that confuse the NEDS users rather than enhance the system. EPA can define more specific guidelines for the expansion of the list. Many of the specific recommendations made earlier and the methodology developed for the evaluation of codes proposed by TACB and Radian can be used to develop these guidelines. The requirement that any agency proposing new codes assess the applicability of the new code, i.e., the number of sources and the emission potential of those sources covered by the proposed code within a given state, would aid in the evaluation of such proposed codes. Based on the fact that the master list is becoming so long and complex, consideration should be given to instituting training programs for NEDS coders. As a minimum, the guidelines suggested earlier to define codes and their usage should be developed. These guidelines could be incorporated into the existing discussion of processes given in AP-42. In any case, these guidelines must be kept brief, clear and simple to avoid confusion. They should answer questions that can cause miscoding.

While these recommendations will not, in and of themselves, solve all the problems involved in using the SCC master list, they should considerably enhance the usefulness of the NEDS.

CHAPTER III  
ENHANCEMENTS OF AEROS INSPECTION/  
ASSESSMENT PROCEDURES

Data submitted to the National Air Data Branch (NADB) should be reviewed by a data auditing system to ensure the integrity of data entered into the National Emissions Data System (NEDS) and the Storage and Retrieval of Aerometric Data (SAROAD) System. If the submitted data cannot pass a computerized editing routine included in such an auditing system, they should be rejected and returned to the originator for correction and re-submittal. Data accepted into NEDS or the SAROAD System should be also subjected to validation checks to identify data anomalies. These anomalies should be noted, and the originator should be asked to verify the data. As part of this effort to enhance the Aerometric and Emissions Reporting System (AEROS), the editing and validation criteria that were proposed for inclusion in a computerized auditing system were reviewed and tested by actually validating NEDS data from two states: North and South Carolina. As a result of this review, enhancements to the proposed auditing system were identified and recommended. In addition, validation criteria were developed to audit SAROAD data to ensure that the data lie within an acceptable range of maximum and minimum values.

NEDS AUDITING PROCEDURES

Two auditing routines for NEDS were reviewed:

- o NEO61 - A computerized editing routine used by NADB and recently modified to reduce the number of error messages. As an editing routine, its primary purpose is to identify format errors of the data submitted into NEDS. The program was not designed to evaluate the quality or validity of data. However, a few validation checks are included. The violation of these validation criteria triggers the issuance of warning messages but does not prevent the incorporation of the data from getting into the NEDS master file.

- o A computerized validation routine under development by NADB. This proposed validation module is a comprehensive data auditing program. The version reviewed in this effort was preliminary, and, thus, some of the recommended enhancements may not be applicable.

These two data auditing systems were reviewed to determine their usefulness and to determine if enhancements to both or either system were desirable.

It is recommended that these two systems be combined. This combination of the two systems could produce some economies of scale in that both programs in various instances edit similar data fields. If they are combined, two audit messages must be used: error and warning. Format errors in certain key fields should cause the rejection of submitted data. The review of other fields should be used to identify data anomalies which would not cause a rejection of the data but, rather, the issuance of a "warning" which would require the originator to verify the accuracy of the data in these fields. Such an auditing system could be used to fulfill two purposes:

1. To edit input transactions so that erroneous data would not be entered into NEDS.
2. To validate data already in NEDS so that existing data could be improved.

No determination of the economic feasibility of developing the software required or of implementing and maintaining the system once developed was made.

#### Recommended Enhancements

Enhancements to the auditing module are recommended. These enhancements, as well as brief discussions of the validation criteria included in the module, are listed in Table III-1. No enhancements are recommended for NEO61 because the two systems should be integrated. No enhancements are recommended for the format edits retained from NEO61 because these criteria are probably adequate. The validation criteria included in that program would in many cases be superseded by those in the module. It was felt that enhancements to the validation criteria in the module would be more valuable. In addition to the enhancements recommended in Table III-1, the following observations were made about proposed validation checks for individual point source data fields:

TABLE III-1

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD   | NAME                                           | EPA VALIDATION CHECK<br>FOR POINT RECORDS                                                                                                                                                                                                                | ES RECOMMENDATIONS                                                                                           |
|---------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 5       | City                                           | Must be a valid entry in the AEROS City County File                                                                                                                                                                                                      |                                                                                                              |
| 6       | UTM Zone<br>(Universal Transverse<br>Mercator) | For each state a valid beginning zone and a valid ending zone. Example: State Oil 15 through 16 are valid. See Table 1.                                                                                                                                  |                                                                                                              |
| 13      | SIC                                            | Must be a valid entry in the SIC Names file.                                                                                                                                                                                                             | The SCC/SIC-IPP table should also be used to identify missing key SCC codes for facilities in the inventory. |
| 14      | IPP Process                                    | A table will be used to match SIC and IPP codes with SCC code. One entry in table for each SCC. Presently about 1,000 SCC codes. Table 2 gives general pattern for table of SCC's vs SIC-IPP codes. If found invalid the error could be in the SCC code. |                                                                                                              |
| 15 & 16 | UTM Coordinates                                | For each state:<br>Horizontal: max & min values<br>Vertical: max & min values                                                                                                                                                                            |                                                                                                              |

TABLE III-1 (CONT'D.)

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD   | NAME                     | EPA VALIDATION CHECK<br>FOR POINT RECORDS                                                                                                                                                                                                                                                                                                                                 | ES RECOMMENDATIONS                                                                                                                                                                                                                          |
|---------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17      | Stack Height             | Must be < 500 ft.                                                                                                                                                                                                                                                                                                                                                         | All stack parameters should be audited based on typical discriminators <sup>(1)</sup> for major SCC groups. The table which relates stack gas flow rates to SCC categories should be expanded to include height, diameter, and temperature. |
| 18      | Stack Diameter           | Must be < .2 of stack height                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                             |
| 19      | Stack Temp               | 77°F to 2,000°F                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                             |
| 20      | Flow Rate                | Must be within range of formulas listed in Table 3 based on SCC                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                             |
| 21      | Plume Height             | Must be ≤ 200 ft.                                                                                                                                                                                                                                                                                                                                                         | Must be $10 \leq P \leq 200$ ft., where $P$ = plume height.                                                                                                                                                                                 |
| 22 & 23 | Points with Common Stack | The number in 58-59 (23) must be > the number in 59-60 (22) unless both the fields are 00 or blank. If one field is 00 or blank then the other field must be 00 or blank. When any transaction is made to a record which has number non-zero numbers in these 2 fields the following message must be printed:<br>"CHECK POINT ID TO for correct points with COMMON STACK" | Validation discriminator <sup>(1)</sup> for exhaust flow rate should be overridden and the audit based on the resulting velocity or flow rate for all points with common stack vs. a specified range or exit velocities or flow rates.      |

(1) The term 'discriminator' refers to specific validation criteria (usually a numerical range) for individual data elements. If the data element falls outside the range of the discriminator, it must be checked.

TABLE III-1 (CONT'D.)

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD | NAME                   | EPA VALIDATION CHECK<br>FOR POINT RECORDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ES RECOMMENDATIONS |
|-------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 25    | Boiler Design Capacity | The maximum design rate x heat content must not be > the boiler design capacity + 20%.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |
| 26-35 | Control Equipment Code | Must be valid code from Section II of AEROS Vol. V (42 codes at present). Also must be valid for the specific pollutant. Table 4 contains this information. Table 4 will need to be updated periodically.                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |
| 36-40 | Control Efficiencies   | Must be in the range of values for each device-pollutant combination in Table 4. In cases where both primary and secondary control devices are coded, this check should apply only to the code for the secondary device. If there is no secondary device (secondary code=000) the check applies to the primary device. If a number is coded for either primary or secondary device, both fields must have device codes, i.e., primary & secondary device fields must both have codes or both be blank. If the control device code fields are blank, the control efficiency field must also be blank. If the control device code=000, then efficiency |                    |

TABLE III 1 (CONT'D.)

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD | NAME                              | EPA VALIDATION CHECK<br>FOR POINT RECORDS                                                                                                                |  | ES RECOMMENDATIONS                                                                                                                                                                                                                                                                                                                                        |
|-------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |                                   |                                                                                                                                                          |  |                                                                                                                                                                                                                                                                                                                                                           |
| 36-40 | Control Efficiencies<br>(Cont'd.) | must be zero or blank. NA indicates control equipment code is not applicable for that pollutant, control device combination.                             |  |                                                                                                                                                                                                                                                                                                                                                           |
| 42-45 | % Thruput                         | All 4 seasons must sum to 100 unless there is only one nonblank season with an entry of 99.                                                              |  |                                                                                                                                                                                                                                                                                                                                                           |
| 46    | Hours/Day                         | Must be $\leq 24$ if not print message and make it blank.                                                                                                |  |                                                                                                                                                                                                                                                                                                                                                           |
| 47    | Days/Week                         | Must be $\leq 7$ if not print message and make it blank.                                                                                                 |  |                                                                                                                                                                                                                                                                                                                                                           |
| 48    | Weeks/Year                        | Must be $\leq 52$ if not print message and make it blank.                                                                                                |  |                                                                                                                                                                                                                                                                                                                                                           |
| 49-53 | Emission Estimates                | Must be $\leq 25,000$ for each pollutant. Check a value for each pollutant because the 25,000 might be changed to a different number for each pollutant. |  | The discriminator <sup>(1)</sup> proposed is too broad and will not identify the majority of errors found in this field. The following discriminator is proposed: for pollutants with emissions > 100 tons/yr. for which the method of estimation # 3 and # 1, emissions should be within $\pm 20\%$ of those calculated using the emission factor table. |

(1) The term 'discrimination' refers to specific validation criteria (usually a numerical range) for individual data elements. If the data element falls outside the range of the discriminator, it must be checked.

TABLE III-1 (CONT'D.)

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD | NAME                            | EPA VALIDATION CHECK<br>FOR POINT RECORDS                                                                                                       | ES RECOMMENDATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 49-53 | Emission Estimates<br>(Cont'd.) |                                                                                                                                                 | <p>The following check can be also made for each Category II SCC series; specific pollutants cannot be blank nor zero. For example, emissions of particulate and SO<sub>2</sub> from boilers (1-01-XXX-XX) and in-process fuel (3-90-XXX-XX) must not be coded or left blank or = 0.</p> <p>Also, once a method = 1 is identified, an emission factor should be computed from the data reported (process &amp; emission) and saved on a separate file so that new/revised emission factors can be computed and reissued through AP-42.</p> |
| 59    | % Space Heat                    | Must be numeric (can have leading blanks, not all blanks) contains an SCC which begins with a 1 or 2 for all other SCC's no check is necessary. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 61-65 | Allowable Emissions             | Must be all 9's or not > than 25,000 for each pollutant. Check a value for each pollutant as for Emission Estimates.                            | <p>For each of the criteria pollutants a discriminator should be established which best represents current regulation trends. For example, a value of 0.03 grains/scf for particulates, which corresponds to a clean plume, could be adopted.</p>                                                                                                                                                                                                                                                                                          |

(1) The term 'discriminator' refers to specific validation criteria (usually a numerical range) for individual data elements. If the data element falls outside the range of the discriminator, it must be checked.

TABLE III-1 (CONT'D.)

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD | NAME                           | EPA VALIDATION CHECK<br>FOR POINT RECORDS                                                                                                                                                  | ES RECOMMENDATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 66    | Compliance Status              | Must be = 1,2,3,4. Cannot be blank.                                                                                                                                                        | <p>SCC processes codes with a secondary code for in-process fuel should be flagged and the existence of the fuel code verified. For example, an asphaltic concrete rotary drier (3-05-002-01) should also have an in-process fuel code, i.e., 2-98-004-01 (residual oil), 3-90-005-01 (distillate oil) or 3-90-006-01 (natural gas).</p> <p>After the semi-annual updates to the file, fuel summaries should be made available to the state &amp; regional offices for manual verification against published data in the Mineral Industry Survey (MIS).</p> |
| 67-68 | Compliance Year & Month        | Must be $\leq$ today - 5 years.                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 69-71 | Date of Update                 | Must be $\leq$ today.                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 72    | Emergency Control              | Must be 0,1,2, blank.                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 78-79 | Operating Rate vs. Design Rate | Operating rate must be $\leq$ 110% design rate. These fields have different units: SCC/YR for operating rate, SCC/HR for design rate, convert design rate to SCC/HR by multiplying it by # |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

TABLE III-1 (CONT'D.)

## NEDS POINT SOURCE INVENTORY DATA QUALITY VALIDATION CHECKS

| FIELD                                                                                                                            | NAME                                                                                             | EPA VALIDATION CHECK<br>FOR POINT RECORDS                          | ES RECOMMENDATIONS                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                  | Operating Rate vs.<br>Design Rate (Cont'd.)                                                      |                                                                    |                                                                                                                                                                                    |
| 80, 81, 83                                                                                                                       | Ash, Sulfur, Heat<br>Content                                                                     | Consistent with ranges in<br>Table 5.                              | Total fuel reported by a facility<br>should be verified against a<br>typical usage range per type of<br>fuel. Ten major types of fuel<br>have been identified in the NEDS<br>file. |
| 84                                                                                                                               | Source Code                                                                                      | For each SCC the following<br>source codes are valid.              |                                                                                                                                                                                    |
|                                                                                                                                  | SCC<br>1-----<br>2-----<br>3-----<br>(except 390-----)<br>390-----<br>4-----<br>5-----<br>6----- | Source Code<br>B<br>C<br>P<br><br>C<br>P<br>S<br>No code necessary |                                                                                                                                                                                    |
| If any of the above fields are blank, then those fields are valid, unless it specifically states that the field cannot be blank. |                                                                                                  |                                                                    | The processing of records with blank fields should be avoided. Records coded with blank fields should be returned to their originator for completion.                              |

- o SIC (Field #13). If the review of the Standard Industrial Classification (SIC) field were linked to the review of the Source Classification Code (SCC) and the Implementation Planning Program (IPP) process code, missing key SCCs might be identified. Also, the completeness of the inventory could be judged more appropriately.
- o Stack Parameters (Fields #17 through 21). The proposed validation checks are much too limited. An order of magnitude error in coding stack parameters such as a stack temperature of 770°F rather than 77°F for emissions from a rock crusher might be undetected if these criteria are used. Yet, such an error, if used in air quality dispersion modeling, could cause significant errors in predicted pollutant concentrations. The validation checks for these parameters must be process specific.
- o Allowable Emissions (Fields #61 through 65). The proposed validation criteria are too broad and should be particularized for individual processes.
- o Operating Rate vs. Design Rate (Fields #78 and 79). The recommended enhancements should prove valuable to anyone using the inventory in air quality maintenance analysis.

Enhancements were not recommended for all of the validation criteria but only for those which were considered to be most important and which promised to improve significantly the quality of NEDS inventory data.

#### Validation Criteria Tests

To determine the feasibility of the proposed validation criteria and the recommended enhancements, the NEDS data files for North and South Carolina were tested against selected validation criteria. There are three methods that can be used to audit data: (1) manual, (2) a semi-automated approach, and (3) an automated computer system. The cost and time required to audit data by a completely manual method or to develop software for an automated approach precluded the adoption of either of these methods for this study. Thus, a semi-automated approach was selected in which the EPA's Emission Inventory System/Permits and Registration (EIS/P&R) was used to retrieve specific data sets from the data file which were then audited

manually. Because of the tediousness of auditing the files manually, the number of SCCs and validation criteria selected were limited. Because of these limitations, the files from two states were audited rather than from one so that anomalous results that might be due to characteristics of a single data file would be reduced. The files for North and South Carolina were selected because there was ready access to them and a familiarity with them.

The classes of SCCs tested included:

- o Emission sources which were fairly common in the two study files.
- o Those sources which were most likely to be major emitters.
- o Sources for which the data in the file were fairly complete.

Using these general criteria, the files were visually inspected, and the following codes were selected for auditing:

- o 1-01-002-01 and 1-02-004-01. These two combustion source categories were selected inasmuch as the emissions from large pulverized coal burning utility boilers (1-01-002-01) and from large residual oil burning industrial boilers (1-02-004-01) are quite significant. The two source categories were likely to have markedly differing source characteristics such as operating efficiencies, schedules, and stack parameters, however. Also, a large amount of data that could be used to establish SCC-specific validation criteria were likely to be available.
- o 3-05-020-01 through 3-05-020-06. The first five codes in this series were grouped because each refers to a crushing operation in a stone quarry. It was felt that most crushing operations should have similar characteristics. The Category IV code 06 (screening/conveying/handling) was grouped with the codes for crushing operations because the source characteristics would be similar.
- o 3-07-001-04 through 3-07-001-06. These codes cover sources in the sulfate pulping industry: recovery boiler/direct contact evaporator, smelt dissolving tank, and lime kiln. The validation criteria for these sources are common to all, and, thus, they were grouped for testing.

- o 3-05-007-01 through 3-05-007-05. Kilns and dryers in the Portland cement manufacturing industry are covered by these codes. They were grouped for auditing because the source characteristics which were validated are similar.

Although the test of the validation criteria was limited to these SCCs, the results should be applicable to most sources in a point source inventory.

For each source selected using the procedures discussed above, the following audit checks were performed:

1. Missing Processes/Sources Within a Plant (missing SCCs). There are two methods that can be used to determine if SCCs might be missing from the data for a particular facility. For each SIC, a specific group of processes or unit operations should be present. If a cross-reference between SICs and SCCs can be established, missing or incorrectly coded SCCs could be determined by retrieving data for an SIC. If the IPP codes are linked to the SIC, a further sophistication would be added to this method. In the second method, a retrieval is made of all SCCs in a given facility. For each "key" SCC a particular group of "sister" SCCs should be present. For example, in a stone quarry, a combination of crushing, materials handling, and storage operations would be expected. If for a particular quarry an SCC for primary crushing is found without the corresponding code for storage, it could be suspected that the storage operation had been inadvertently overlooked. The second method for finding SCCs was tested because of a high probability that the SIC might be missing or incorrectly coded.
2. Validation of Stack Parameters. Table III-2 lists the validation criteria used to check the stack parameters for possible error. Most of the validation criteria included in Table III-2 were culled from Exhaust Gases from Combustion and Industrial Processes (EPA Publication No. APTD-0805) which contains ranges of typical values of stack parameters for selected industrial processes. These criteria were modified, to reflect current operating practice. The audit check for flow rate/exit velocity is a particularly important check among stack parameter audits. Although an audit of exit

TABLE III-2  
VALIDATION CRITERIA FOR STACK PARAMETERS

| SCC                                   | STACK<br>DIAMETER (FT) | TEMPERATURE<br>(°F) | STACK<br>HEIGHT (FT) | EXIT VELOCITY<br>(FEET/SECOND) | PLUME <sup>(1)</sup><br>HEIGHT (FT) |
|---------------------------------------|------------------------|---------------------|----------------------|--------------------------------|-------------------------------------|
| 1-01-002-01                           | 15-30                  | 250-370             | 200-800              | 30-60                          | --                                  |
| 1-02-004-01                           | 5-30                   | 250-700             | 100-500              | 30-60                          | --                                  |
| 3-07-001-06                           | 1-15                   | 150-350             | 30-250               | 20-40                          | --                                  |
| 3-05-020-01<br>through<br>3-05-020-06 | 1-10                   | 60- 80              | 20- 50               | 5-30                           | 10-200                              |
| 3-05-007-01<br>through<br>3-05-007-05 | 5-20                   | 250-750             | 100-300              | 20-60                          | --                                  |

(1) The plume rise must be given if no stack parameters are coded.

velocity is recommended and these criteria were tested accordingly, there is certainly considerable merit in the validation criteria for flow rate proposed for the validation module. The proposed flow rate validation is particularly appropriate for those SCCs for which little stack characterization data are available. The recommended approach, however, is probably superior for such major sources as combustion. EPA might consider combining the two approaches.

3. Universal Transverse Mercator (UTM) Validation. The method used to audit UTMs was similar to that proposed in the module but was applied to determine if the source was correctly located in a specific county rather than just the state in general. A state was divided into a number of boxes which contained one or more counties. The coordinates coded in the file for each source were compared with the coordinates of the corners of the box which contained the county in which the source was located.
4. Emissions Audit. Two separate steps were used to audit emissions: (1) the record was checked to determine if the entry for particulate emissions for those sources with a high emission potential based on a review of AP-42 was blank or zero, and (2) if the entry was not blank or zero, a ratio,  $R$ , was calculated using the formula,

$$R = \frac{E_1}{E_2}$$

where,  $E_1$  = Reported emissions

$E_2$  = Calculated emissions using annual throughput and the emission factors associated with the appropriate SCC.

$R$  was then checked to see if it fell within a range from 1.4 to 0.6. Although the recommendation has been made that only sources with emissions  $\geq 100$  tons/year be audited, all sources selected for auditing in this test were checked.

5. Validation of Annual Operating Rate vs. Design Rate. The criteria proposed for the validation module were tested. A ratio,  $R$ , was calculated using the formula,

$$R = \frac{H_2}{H_1}$$

where,  $H_1$  = Theoretical maximum operating rate (maximum design rate X operating schedule)

$H_2$  = Annual operating rate reported

### Results of the Validation Criteria Tests

Table III-3 presents the results of the test of the validation criteria, i.e., operating and design rates, emissions, plume height, stack height, stack diameter, temperature, and exit velocity in terms of the percentage of records reviewed which failed an audit. As can be seen from this table, the overwhelming majority of the records reviewed failed at least one criteria test. According to these tests results, most of the anomalies, if the large number of blank data entries is disregarded, were detected by tests of emissions, stack gas velocity, and operating and design rates. Of a total of 136 plants tested, 42 were missing UTM coordinates and the coordinates of another 22 were apparently anomalous. Of all the facilities tested, none were found to have all the SCCs which were expected.

There are two readily apparent explanations for the large number of points which failed to pass these audits:

1. There are numerous, severe problems with the data files audited. This conclusion must be conceded because of the numerous missing items in the data. Both files were rather old but were used primarily because of their ready availability. Both files have been substantially updated recently.
2. The auditing criteria used in the test may have been too sensitive, i.e., the range of discriminators used as audit criteria may be too narrow and, thus, resulted in the rejection of too many "good" records. Although the best information available was used, it is probable that many of the records rejected were not in error. The next step in an auditing procedure would be to request that the originator of any apparently anomalous data verify the correctness of that data.

TABLE III-3

PERCENT OF RECORDS WHICH FAILED  
INDIVIDUAL VALIDATION CRITERIA

| VALIDATION<br>CRITERIA          | REASON FOR<br>FAILURE | 1-01-002-01 |    | 1-02-004-01 |    | 3-05-020-01/06 |    | 3-07-001-04/06 |    | 3-05-007-01/02    |     | OVERALL<br>FAILURE<br>RATE |
|---------------------------------|-----------------------|-------------|----|-------------|----|----------------|----|----------------|----|-------------------|-----|----------------------------|
|                                 |                       | NC          | SC | NC          | SC | NC             | SC | NC             | SC | NC <sup>(1)</sup> | SC  |                            |
| Number of Re-<br>cords Tested   |                       | 4           | 16 | 49          | 38 | 162            | 71 | 27             | 26 | 0                 | 7   |                            |
| Operating<br>and Design<br>Rate | Blank                 | 0           | 0  | 12          | 0  | 10             | 80 | 0              | 0  | --                | 100 | 22                         |
|                                 | Incorrect             | 25          | 19 | 18          | 32 | 7              | 0  | 7              | 4  | --                | 0   | 10                         |
| Emissions                       | Blank                 | 0           | 0  | 18          | 16 | 8              | 4  | 4              | 0  | --                | 0   | 8                          |
|                                 | Incorrect             | 0           | 19 | 14          | 18 | 27             | 52 | 44             | 88 | --                | 57  | 34                         |
| Plume<br>(2)<br>Height          | Blank                 | --          | -- | --          | -- | 38             | 6  | --             | -- | --                | --  | 16                         |
|                                 | Incorrect             | --          | -- | --          | -- | 2              | 0  | --             | -- | --                | --  | 1                          |
| Stack<br>Height                 | Blank                 | 0           | 0  | 2           | 0  | 2              | 1  | 0              | 0  | --                | 86  | 3                          |
|                                 | Incorrect             | 0           | 19 | 45          | 29 | 0              | 0  | 0              | 0  | --                | 0   | 9                          |
| Stack<br>Diameter               | Blank                 | 0           | 0  | 22          | 0  | 2              | 1  | 0              | 0  | --                | 0   | 4                          |
|                                 | Incorrect             | 75          | 38 | 29          | 5  | 0              | 0  | 0              | 0  | --                | 29  | 7                          |
| Temperature                     | Blank                 | 0           | 0  | 8           | 13 | 2              | 4  | 0              | 0  | --                | 0   | 4                          |
|                                 | Incorrect             | 25          | 44 | 16          | 3  | 1              | 0  | 19             | 4  | --                | 14  | 6                          |

TABLE III-3 (CONT'D.)

PERCENT OF RECORDS WHICH FAILED  
INDIVIDUAL VALIDATION CRITERIA

| VALIDATION<br>CRITERIA                                      | 1-01-002-01 |    | 1-02-004-01 |    | 3-05-020-01/06 |    | 3-07-001-04/06 |    | 3-05-007-01/02    |     | OVERALL<br>FAILURE<br>RATE |
|-------------------------------------------------------------|-------------|----|-------------|----|----------------|----|----------------|----|-------------------|-----|----------------------------|
|                                                             | NC          | SC | NC          | SC | NC             | SC | NC             | SC | NC <sup>(1)</sup> | SC  |                            |
| Exit                                                        | 0           | 0  | 10          | 16 | 0              | 1  | 0              | 0  | --                | 14  | 3                          |
| Velocity                                                    |             |    |             |    |                |    |                |    |                   |     |                            |
| Blank                                                       | 0           | 0  | 10          | 16 | 0              | 1  | 0              | 0  | --                | 14  | 3                          |
| Incorrect                                                   | 50          | 62 | 69          | 18 | 0              | 1  | 33             | 50 | --                | 29  | 20                         |
| Total %<br>Failure<br>by SCC of<br>at least<br>One Criteria | 100         | 81 | 96          | 92 | 60             | 86 | 78             | 92 | --                | 100 |                            |

(1) There were no sources with this SCC in the North Carolina file.

(2) The plume height validation criteria apply only to the SCC 3-05-020-01/06.

It can be further concluded that several iterations of auditing and verifying data may be necessary before the auditing criteria can be refined.

It is recommended that any computerized validation program be tested on real data before it is finally adopted by EPA. The data from a minimum of two states should be tested in this recommended effort. The anomalies identified must be verified. Also, randomly selected data from records which passed the audit should be independently verified. Not only can auditing routines be too sensitive, but also too insensitive. Before these tests are run, however, a major effort should be made to update the data files so that they are as complete as possible. A computerized auditing program which has been subjected to such tests can be quite useful in improving the quality of NEDS data.

#### SAROAD AUDITING PROCEDURES

After reviewing possible enhancements of auditing systems for SAROAD, it was determined, in concurrence with EPA, that the most valuable enhancement would be a list of validation criteria for individual pollutants and sampling methods delineating maximum and minimum values of data. Because of limited time and fiscal resources, this development of maximum/minimum discriminators was limited to those pollutants and sampling methods for which data were readily available.

Table III-4 lists selected minimum value and maximum value discriminators for pollutants for which there are EPA designated reference and equivalent methods. These discriminators are based on the required performance specifications for the methods in accordance with 40 CFR 53 and the lower detectable limit of sensitivities as determined under the performance tests. In compiling the table, a complete summary of actual values for the lower detectable limits as determined by the performance tests was unavailable. However, EPA specifications require the limit to be at least 0.01 ppm for ozone, sulfur dioxide and nitrogen dioxide.

Selection of discriminators for methods other than EPA-designated reference and equivalent methods requires prior knowledge of the measurement range used, and the lower detectable limit of sensitivity of the method.

TABLE III-4

## SELECTED MINIMUM &amp; MAXIMUM VALUE DISCRIMINATORS FOR EPA DESIGNATED METHODS

| Parameter       | EPA-Designated Method | Maximum Value (ppm) | Minimum Value (ppm) |
|-----------------|-----------------------|---------------------|---------------------|
| SO <sub>2</sub> | EQS-0775-001          | 0.5                 | *                   |
| SO <sub>2</sub> | EQS-0775-002          | 0.5                 | *                   |
| SO <sub>2</sub> | EQSA-1275-005         | 0.5                 | *                   |
| SO <sub>2</sub> | EQSA-1275-006         | 0.5                 | 0.004               |
| SO <sub>2</sub> | EQSA-0276-009         | 0.5                 | 0.003               |
| SO <sub>2</sub> | EQSA-0676-010         | 0.5                 | *                   |
| SO <sub>2</sub> | EQSA-0876-011         | 0.5                 | *                   |
| SO <sub>2</sub> | EQSA-0876-013         | 0.5                 | *                   |
| SO <sub>2</sub> | RFOA-1075-003         | 0.5                 | *                   |
| O <sub>3</sub>  | RFOA-1075-004         | 0.5                 | 0.002               |
| O <sub>3</sub>  | RFOA-0176-007         | 0.5                 | 0.001               |
| O <sub>3</sub>  | RFOA-1076-014         | 0.5                 | *                   |
| O <sub>3</sub>  | RFOA-1076-015         | 0.5                 | *                   |
| O <sub>3</sub>  | RFOA-1076-016         | 0.5                 | *                   |
| O <sub>3</sub>  | RFOA-1176-017         | 0.5                 | *                   |
| O <sub>3</sub>  | EQOA-0577-019         | 0.5                 | *                   |
| O <sub>3</sub>  | RFOA-0577-020         | 0.5                 | *                   |
| O <sub>3</sub>  | RFCA-0276-008         | 50                  | 0.500               |
| CO              | RFCA-0876-012         | 50                  | 0.500               |
| CO              | RFCA-0177-018         | 50                  | 0.500               |
| NO <sub>2</sub> | RFNA-0677-021         | 0.5                 | *                   |
| NO <sub>2</sub> | RFNA-0777-022         | 0.5                 | *                   |

\*Performance Specifications require a lower detectable limit of at least 0.01 ppm.

Because the lower detectable limit may be affected by such factors as sampling rate and instrument averaging time, these variables must be also taken into account when determining the lower detectable limit of sensitivity.

A feasibility analysis was performed to develop screening criteria or discriminators for use in identifying raw SAROAD data which fall outside the range and/or sensitivity of measurement methods. The following conclusions were drawn.

1. It is feasible to develop a set of minimum and maximum value discriminators for those pollutants for which there are EPA-designated reference and equivalent methods. Such designated methods require use of one specific measurement range, and conformity with specific performance specifications including the lower detectable limit of sensitivity.
2. Development of minimum/maximum discriminators for pollutants measured by methods other than designated reference or equivalent methods is not feasible, because of the greater diversity of procedures and instrumentation being used which are based on the same principles of measurement and are assigned the same method code. Such procedures, manual or instrumental, may or may not have the same sensitivity and may be used on one of several different measurement ranges.
3. The establishment of a maximum value discriminator based on a method's measurement range as opposed to the current system of using a single maximum value for each parameter code will provide more realistic auditing. However, the establishment of such a system would require the inclusion of a measurement range code in the SAROAD Parameter Method File.
4. The establishment of a minimum value discriminator based on a method's lower detectable limit of sensitivity can be readily accomplished by using the minimum detectable values which are maintained in the Parameter Method File. An audit using the minimum value discriminator will have little consequence, however, because it is not unusual for many pollutants to occur at ambient concentrations which are less than the lower detectable limit of sensitivity of a method. For some

parameters, such as methane and suspended particulate, ambient concentrations remain well above the minimum detectable values due to high natural background levels. In such cases, the lower detectable limit of sensitivity is a poor choice for a discriminator.

#### GENERAL CONCLUSIONS AND RECOMMENDATIONS

NADB certainly needs computerized auditing systems for NEDS and SAROAD data because of the importance of preserving the integrity and quality of these data coupled with the enormity of the task of auditing all the data in NEDS and SAROAD. The proposed validation module is a significant step beyond existing programs such as NEO61. Its development should go forward. Yet, the validation module under development is not perfect. Some major improvements to the module are recommended and, if accepted, these enhancements should significantly improve the auditing criteria included in the module. It must be emphasized, however, that any system should be thoroughly tested before being adopted for use. As anomalous data are identified by an auditing system and verified by the originators, the auditing system could be subjected to continuous testing to determine its precision and accuracy.

## CHAPTER IV

### FEASIBILITY OF A QUALITATIVE INDEX FOR NEDS

Whenever a vast quantity of data is handled by a computerized system such as the National Emissions Data System (NEDS), inevitably there are questions about the "quality" of the data in the system. Quality refers not only to the correctness of the data in a file but also to the completeness of the file and its age. One must know if the data to be used for such activities as air quality maintenance planning are correct, complete, and current. In an effort to address this issue related to the quality of NEDS data, the National Air Data Branch (NADB) requested that a proposed Emission Inventory Quality Index be reviewed to determine its feasibility, recommended improvements be made to this proposed index, or a new index be developed.

#### REVIEW OF PROPOSED EMISSION INVENTORY QUALITY INDEX

The Emission Inventory Quality Index (EIQI) which has been proposed includes seven key elements which could be used to judge the quality of a NEDS data file:

1. Base Year. If the data in a file are more than two years old, major updates and revisions, which would be necessary to reflect what may be substantial changes in the emission inventory, may not have been made. Thus, the age of the data file is of considerable importance in judging its quality.
2. Semiannual Report Currency. Each state is required by Environmental Protection Agency (EPA) regulations to report semiannually emissions and other related data for all new sources, sources that cease operation, and sources which achieve compliance during the reporting period (40 CFR 51.7). If the NEDS file has not been updated with these semiannual reports, it will not be current and may not be complete. The semiannual reporting requirement is not sufficient, however, to ensure that the file will be completely updated. Semiannual reports should be used to supplement periodic inventory updates.

3. Verification File. EPA is attempting to create a "verification file" of sources not presently in NEDS by using information available from Dunn and Bradstreet, state industrial directories, and other similar references. The Regional offices, in liaison with the states, have been requested to verify the existence of point sources in the verification file and to determine if those that exist should be incorporated into NEDS. The size of the verification file for a particular state when compared with the size of the state's NEDS file is an indication of the completeness of the NEDS file.
4. NEDS/CDS Mismatches. Sources which appear in Compliance Data System (CDS) should be present in NEDS. Efforts are underway to eliminate these mismatches.
5. SIEFA. The Source, Inventory, and Emission Factor Analysis (SIEFA) computer program is supposed to provide an indication of the precision and accuracy of a state's emission inventory.
6. Data Anomalies. As described in Chapter III, NADB is developing computerized data auditing systems to identify apparent data anomalies. NEDS users often identify data anomalies, as well. The number of anomalies identified by either method is an indication of the correctness of NEDS data.
7. Missing Items. NADB has an automated system for identifying items missing from a NEDS file. Only key items which are not included in edit checks, i.e., those items which will cause the entire data set to be rejected, should be considered. Years of record, city, Standard Industrial Classification (SIC), and estimation method cannot be considered, because if they are missing the data set will be rejected. On the other hand, contact personnel and all Card 5 data should be excluded because they are not key data.

A single EIQI can be calculated using a multiple linear equation to combine these seven quality factors. Of necessity, this formula causes some factors to be given more importance than others.

Neither the EIQI or any other proposed indices should be adopted at this time. An index should be simple and readily understood and all of the proposed indices are much too complex. Although the factors identified are important,

there is considerable disagreement concerning their relative importance. Many of the inputs to an index are still in the development stage. An improved automated data auditing system would be particularly useful for input to an index. For all of these reasons, an EIQI is not feasible at present.

#### CONCLUSIONS AND RECOMMENDATIONS

There is, however, much that could be done during the next few years to hasten the implementation of a NEDS data quality index, although such index is not currently feasible. NADB should supply a statistical quality report on each state's data files to NEDS users. These reports could be output by an automated auditing system. Few software modifications would be necessary. In general, the reports would identify the percentage of records in a file which fail to pass individual validation criteria. (A format similar to Table III-3 could be used.) Other quality measures such as completeness and age could be incorporated as well. These reports could be used to identify problems with the data files, as well as provide a method for comparing the quality of a state's file with that of another state.

APPENDIX A  
CODES PROPOSED BY TACB

# ADDITIONS TO WEBS SOURCE CLASSIFICATION CODES

## INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING

|                     |                           | <u>Units</u> |
|---------------------|---------------------------|--------------|
| Plastics            |                           |              |
| 3-01-018-06         | High Density Polyethylene | Tons Product |
| -07                 | Low Density Polyethylene  | "            |
| -08                 | Polybutadiene             | "            |
| -09                 | Polypropylene             | "            |
| -10                 | Polystyrene               | "            |
| Phthalic Anhydride  |                           |              |
| 3-01-019-01         | via Naphthalene           | "            |
| -02                 | via O-Xylene              | "            |
| Amines/Amides       |                           |              |
| 3-01-034-02         | Diethylamine              | "            |
| -03                 | tertButylamine            | "            |
| -04                 | Ethanolamine              | "            |
| -05                 | Ethyleneamine             | "            |
| -06                 | Hexamethylenediamine      | "            |
| -07                 | nPropylamine              | "            |
| -08                 | Urea                      | "            |
| Acetaldehyde        |                           |              |
| 3-01-131-01         | General                   | "            |
| -02                 | via Ethylene              | "            |
| -03                 | via Ethanol               | "            |
| Acetic Acid         |                           |              |
| 3-01-132-01         | General                   | "            |
| -02                 | via Methanol              | "            |
| -03                 | via Butane                | "            |
| -04                 | via Acetaldehyde          | "            |
| Acetic Anhydride    |                           |              |
| 3-01-133-01         | General                   | "            |
| -02                 | via Acetic Acid           | "            |
| -03                 | via Ethylene Oxidation    | "            |
| Acetone Cyanohydrin |                           |              |
| 3-01-134-01         | General                   | "            |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                            | <u>Units</u> |
|----------------------------|--------------|
| Acetonitrile               |              |
| 3-01-135-01 General        | Tons Product |
| Acetylene                  |              |
| 3-01-136-01 General        | "            |
| Acrylates                  |              |
| 3-01-137-01 Butyl Acrylate | "            |
| -02 Ethyl Acrylate         | "            |
| -03 Methyl Acrylate        | "            |
| -04 Butyl Methacrylate     | "            |
| -05 isoButyl Methacrylate  | "            |
| -06 Ethyl Methacrylate     | "            |
| -07 Methyl Methacrylate    | "            |
| -99 Other/Not Classified   | "            |
| Acrylic Acid               |              |
| 3-01-138-01 General        | "            |
| Acrylonitrile              |              |
| 3-01-139-01 General        | "            |
| Adiponitrile               |              |
| 3-01-140-01 General        | "            |
| -02 via Adipic Acid        | "            |
| -03 via Butadiene          | "            |
| Allyl Alcohol              |              |
| 3-01-141-01 General        | "            |
| Allyl Chloride             |              |
| 3-01-142-01 General        | "            |
| Aniline                    |              |
| 3-01-143-01 General        | "            |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                          | <u>Units</u> |
|--------------------------|--------------|
| Bisphenol A              |              |
| 3-01-144-01 General      | Tons Product |
| nButyl Alcohol           |              |
| 3-01-145-01 General      | "            |
| secButyl Alcohol         |              |
| 3-01-146-01              | "            |
| isoButyl Alcohol         |              |
| 3-01-147-01 General      | "            |
| tertButyl Alcohol        |              |
| 3-01-148-01 General      | "            |
| nButyl Chloride          |              |
| 3-01-149-01 General      | "            |
| 1,3-Butylene Glycol      |              |
| 3-01-150-01 General      | "            |
| Butyraldehyde            |              |
| 3-01-151-01 General      | "            |
| Carbon Disulfide         |              |
| 3-01-152-01 General      | "            |
| Carbon Tetrachloride     |              |
| 3-01-153-01 General      | "            |
| Cellosolves <sup>R</sup> |              |
| 3-01-154-01 General      | "            |



INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                               | <u>Units</u> |
|-------------------------------|--------------|
| Chlorohydrins                 |              |
| 3-01-155-01 General           | Tons Product |
| Chloroform                    |              |
| 3-01-156-01 General           | "            |
| Chloroprene                   |              |
| 3-01-157-01 General           | "            |
| Cyclohexanol                  |              |
| 3-01-158-01 General           | "            |
| Cyclohexanone                 |              |
| 3-01-159-01 General           | "            |
| Dichlorobutene                |              |
| 3-01-160-01 General           | "            |
| Dichloroethane                |              |
| 3-01-161-01 General           | "            |
| -02 1,1-Dichloroethane        | "            |
| -03 1,2-Dichloroethane        | "            |
| Diethyl Ether                 |              |
| 3-01-162-01 General           | "            |
| Diisopropyl Ether             |              |
| 3-01-163-01 General           | "            |
| Dimethyl Terephthalate (+TPA) |              |
| 3-01-164-01 General           | "            |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                         | <u>Units</u> |
|-------------------------|--------------|
| 1,4-Dioxane             |              |
| 3-01-165-01 General     | Tons Product |
| Dipropyl Ether          |              |
| 3-01-166-01 General     | "            |
| Ethyl Acetate           |              |
| 3-01-167-01 General     | "            |
| Ethyl Alcohol           |              |
| 3-01-168-01 General     | "            |
| Ethyl Benzene           |              |
| 3-01-169-01 General     | "            |
| Ethyl Chloride          |              |
| 3-01-170-01 General     | "            |
| Ethylene                |              |
| 3-01-171-01 General     | "            |
| 1,2-Ethylene Dichloride |              |
| 3-01-172-01 General     | "            |
| Ethylene Glycol         |              |
| 3-01-173-01 General     | "            |
| Ethylene Oxide          |              |
| 3-01-174-01 General     | "            |
| Freons                  |              |
| 3-01-175-01 General     | "            |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                      |                                | <u>Units</u> . |
|----------------------|--------------------------------|----------------|
| Glycerin             |                                |                |
| 3-01-176-01          | General                        | Tons Product   |
| -02                  | via Epichlorohydrin            | "              |
| -03                  | via Allyl Chloride             | "              |
| -04                  | via Acrolein-Hydrogen Peroxide | "              |
| -05                  | via Propylene-Chlorine         | "              |
| 1,6-Hexanediol       |                                |                |
| 3-01-177-01          | General                        | "              |
| Hydan <sup>R</sup>   |                                |                |
| 3-01-178-01          | General                        | "              |
| Hydrogen Cyanide     |                                |                |
| 3-01-179-01          | General                        | "              |
| -02                  | Direct Process                 | "              |
| Hypalon <sup>R</sup> |                                |                |
| 3-01-180-01          | General                        | "              |
| Isocyanates          |                                |                |
| 3-01-181-01          | General                        | "              |
| Isoprene             |                                |                |
| 3-01-182-01          | General                        | "              |
| Lactic Acid          |                                |                |
| 3-01-183-01          | General                        | "              |
| Methyl Acetate       |                                |                |
| 3-01-184-01          | General                        | "              |
| Methyl Alcohol       |                                |                |
| 3-01-185-01          | General                        | "              |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                        | <u>Units</u> |
|------------------------|--------------|
| Methyl Chloride        |              |
| 3-01-186-01 General    | Tons Product |
| Methyl Chloroform      |              |
| 3-01-187-01 General    | "            |
| Methyl isoButyl Ketone |              |
| 3-01-188-01 General    | "            |
| Methacrylonitrile      |              |
| 3-01-189-01 General    | "            |
| Methylcyclohexane      |              |
| 3-01-190-01 General    | "            |
| Methylcyclopentane     |              |
| 3-01-191-01 General    | "            |
| Methyl Ethyl Ketone    |              |
| 3-01-192-01 General    | "            |
| Methyl Propyl Ether    |              |
| 3-01-193-01 General    | "            |
| Methylene Chloride     |              |
| 3-01-194-01 General    | "            |
| Nitromethane           |              |
| 3-01-195-01 General    | "            |
| Nordel <sup>R</sup>    |              |
| 3-01-196-01 General    | "            |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                          | <u>Units</u> |
|--------------------------|--------------|
| Olefins                  |              |
| 3-01-197-01 Ethylene     | Tons Product |
| -02 Propylene            | "            |
| -03 Butylene             | "            |
| -99 Other/Not Classified | "            |
| Oxo Process              |              |
| 3-01-198-01 General      | "            |
| Paraformaldehyde         |              |
| 3-01-199-01 General      | "            |
| Perchloroethylene        |              |
| 3-01-200-01 General      | "            |
| Pentaerythritol          |              |
| 3-01-201-01 General      | "            |
| Phenol                   |              |
| 3-01-202-01 General      | "            |
| isoPropyl Alcohol        |              |
| 3-01-203-01 General      | "            |
| Propylene Glycol         |              |
| 3-01-204-01 General      | "            |
| Propylene Oxide          |              |
| 3-01-205-01 General      | "            |
| Styrene                  |              |
| 3-01-206-01 General      | "            |

INDUSTRIAL PROCESS - CHEMICAL MANUFACTURING continued

|                      | <u>Units</u> |
|----------------------|--------------|
| Tetraethyl Lead      |              |
| 3-01-207-01 General  | Tons Product |
| Tetrahydrofuran      |              |
| 3-01-208-01 General  | "            |
| Trichloroethylene    |              |
| 3-01-209-01 General  | "            |
| Trimethylolpropane   |              |
| 3-01-210-01 General  | "            |
| Triton <sup>R</sup>  |              |
| 3-01-211-01 General  | "            |
| Vinyl Acetate        |              |
| 3-01-212-01 General  | "            |
| -02 via Acetylene    | "            |
| -03 via Ethylene     | "            |
| Vinyl Chloride       |              |
| 3-01-213-01 General  | "            |
| Vinylidene Chloride  |              |
| 3-01-214-01 General  | "            |
| Voranol <sup>R</sup> |              |
| 3-01-215-01 General  | "            |

INDUSTRIAL PROCESS - PRIMARY METALS

Aluminum Ore - Bauxite

3-03-000-02 Alumina Mfg.

Units

Tons Product

Aluminum Ore - Electrolytic Reduction

3-03-001-06 Ingot Casting  
-07 Aluminum Fluoride Mfg.  
-08 Cryolite Mfg.

Tons Metal  
Tons Produced  
"

Iron Production

3-03-008-09 Ingot Casting  
-10 Ore Calcining

Tons Metal  
Tons Produced

Magnesium - Electrolytic

3-03-035-01 Magnesium Oxide Kiln  
-02 Magnesium Chloride Neutralizer  
-03 Magnesium Chloride Dryer  
-04 Magnesium Chloride Cells  
-05 Magnesium Casting/Alloying  
-99 Other/Not Classified

Tons Produced  
"  
"  
Tons Metal  
"  
"

INDUSTRIAL PROCESS - PETROLEUM INDUSTRY

|                           | <u>Units</u>                 |
|---------------------------|------------------------------|
| Crude Distillation        |                              |
| 3-06-014-01 General       | 1000 Barrels Processed       |
| Gas Recovery/Liquifaction |                              |
| 3-06-015-01 General       | Million Cubic Feet Processed |
| Gas Sweetening            |                              |
| 3-06-016-01 General       | "                            |
| Hydrogen Treating         |                              |
| 3-06-017-01 General       | 1000 Barrels Charged         |
| Aromatic Recovery         |                              |
| 3-06-018-01 General       | "                            |
| Solvent Extraction        |                              |
| 3-06-019-01 General       | "                            |
| Acid Treating             |                              |
| 3-06-020-01 General       | "                            |
| Polymerization            |                              |
| 3-06-021-01 General       | 1000 Barrels Processed       |
| Isomerization             |                              |
| 3-06-022-01 General       | "                            |
| Alkylation                |                              |
| 3-06-023-01 General       | "                            |
| Dehydrogenation           |                              |
| 3-06-024-01 General       | "                            |

INDUSTRIAL PROCESS - PETROLEUM INDUSTRY continued

|                       | <u>Units</u>             |
|-----------------------|--------------------------|
| Lube Oil              |                          |
| 3-06-025-01 General   | 1000 Barrels Processed   |
| Delayed Coking        |                          |
| 3-06-026-01 General   | 1000 Barrels Charged     |
| Calcining             |                          |
| 3-06-027-01 General   | Tons Processed           |
| Waste Water Treatment |                          |
| 3-06-028-01 General   | 1000 Barrels Waste Water |

INDUSTRIAL PROCESSES - NATURAL GAS INDUSTRY

|                     |                           | <u>Units</u>                 |
|---------------------|---------------------------|------------------------------|
| Compression         |                           |                              |
| 3-10-001-01         | Blowdown                  | Million Cubic Feet Processed |
| -02                 | Fugitive                  | "                            |
| Dehydration         |                           |                              |
| 3-10-002-01         | tri Ethylene Glycol       | "                            |
| -99                 | Other/Not Classified      | "                            |
| Gas Sweetening      |                           |                              |
| 3-10-003-01         | MEA Process w/Flare       | "                            |
| -02                 | MEA Process w/Incinerator | "                            |
| -99                 | Other/Not Classified      | "                            |
| Natural Gas Liquids |                           |                              |
| 3-10-004-01         | Refrigeration             | 1000 Gallons Product         |
| -02                 | Absorption                | "                            |
| -03                 | Fractionation             | "                            |
| -04                 | Adsorption                | "                            |
| -99                 | Other/Not Classified      | "                            |
| Flares              |                           |                              |
| 3-10-005-01         | Waste Gas                 | Million Cubic Feet           |

INDUSTRIAL PROCESS - PLASTIC FABRICATION

|                      |                   | <u>Units</u> |
|----------------------|-------------------|--------------|
| Melamine             |                   |              |
| 3-11-001-01          | General           | Tons Product |
| -99                  | Solvent-Specify   | Tons Solvent |
| Phenolic             |                   |              |
| 3-11-002-01          | General           | Tons Product |
| -99                  | Solvent-Specify   | Tons Solvent |
| Polyester            |                   |              |
| 3-11-003-01          | General           | Tons Product |
| -02                  | Fiberglass        | "            |
| -99                  | Solvent-Specify   | Tons Solvent |
| Polystyrene          |                   |              |
| 3-11-004-01          | General           | Tons Product |
| -02                  | Styrofoam         | "            |
| -99                  | Solvent-Specify   | Tons Solvent |
| Polyurethane         |                   |              |
| 3-11-005-01          | General           | Tons Product |
| -99                  | Solvent-Specify   | Tons Solvent |
| Polyvinyl Chloride   |                   |              |
| 3-11-006-01          | General           | Tons Product |
| -99                  | Solvent-Specify   | Tons Solvent |
| Other/Not Classified |                   |              |
| 3-11-999-99          | Specify in Remark | Tons Product |

JOINT SOURCE EVAPORATION - CLEANING SOLVENT

|                |                    | <u>Units</u> |
|----------------|--------------------|--------------|
| Surface Wiping |                    |              |
| 4-01-003-01    | Acetone            | Tons Solvent |
| -02            | Butyl Acetate      | "            |
| -03            | Butyl Alcohol      | "            |
| -04            | Carbitol           | "            |
| -05            | Cellosolve         | "            |
| -06            | Cellosolve Acetate | "            |
| -07            | Dimethylformamide  | "            |
| -08            | Ethyl Acetate      | "            |
| -09            | Ethyl Alcohol      | "            |
| -10            | Gasoline           | "            |
| -11            | Isopropyl Alcohol  | "            |
| -12            | Isopropyl Acetate  | "            |
| -13            | Kerosene           | "            |
| -14            | Lactol Spirits     | "            |
| -15            | Methyl Acetate     | "            |
| -16            | Methyl Alcohol     | "            |
| -17            | MEK                | "            |
| -18            | MIBK               | "            |
| -19            | Mineral Spirits    | "            |
| -20            | Naphtha            | "            |
| -21            | Toluene            | "            |
| -22            | Varsol             | "            |
| -23            | Xylene             | "            |
| -99            | Other-Specify      | "            |

POINT SOURCE EVAPORATION - SURFACE COATING

Units

Sealing Compounds

4-02-010-01 General  
-99 Solvent-Specify

Tons Coating  
Tons Solvent

POINT SOURCE EVAPORATION - PETROLEUM PRODUCTION STORAGE

|               |                           | <u>Units</u>           |
|---------------|---------------------------|------------------------|
| Fixed Roof    |                           |                        |
| 4-03-001-17   | Breath - Naphtha          | 1000 Gal Stge Capacity |
| -18           | Breath - Reformate        | "                      |
| -19           | Breath - Alkylate         | "                      |
| -20           | Breath - Gas Oil          | "                      |
| -21           | Breath - Residual Oil     | "                      |
| -22           | Breath - LPG              | "                      |
| -62           | Working - Naphtha         | 1000 Gal Throughput    |
| -63           | Working - Reformate       | "                      |
| -64           | Working - Alkylate        | "                      |
| -65           | Working - Gas Oil         | "                      |
| -66           | Working - Residual Oil    | "                      |
| -67           | Working - LPG             | "                      |
| Floating Roof |                           |                        |
| 4-03-002-17   | Stand Stge - Naphtha      | 1000 Gal Stge Capacity |
| -18           | Stand Stge - Reformate    | "                      |
| -19           | Stand Stge - Alkylate     | "                      |
| -20           | Stand Stge - Gas Oil      | "                      |
| -21           | Stand Stge - Residual Oil | "                      |

POINT SOURCE EVAPORATION - PETROCHEMICAL STORAGE

Fixed Roof - Breathing

Units

|             |                           |                        |
|-------------|---------------------------|------------------------|
| 4-04-001-01 | Acetaldehyde              | 1000 Gal Stge Capacity |
| -02         | Acetic Acid               | "                      |
| -03         | Acetic Anhydride          | "                      |
| -04         | Acetone                   | "                      |
| -05         | Acetonitrile              | "                      |
| -06         | Acrylonitrile             | "                      |
| -07         | Allyl Alcohol             | "                      |
| -08         | Allyl Chloride            | "                      |
| -09         | Butadiene                 | "                      |
| -10         | secButyl Alcohol          | "                      |
| -11         | isoButyl Alcohol          | "                      |
| -12         | tertButyl Alcohol         | "                      |
| -13         | nButyl Chloride           | "                      |
| -14         | Carbon Tetrachloride      | "                      |
| -15         | Chloroform                | "                      |
| -16         | Chloroprene               | "                      |
| -17         | Cumene                    | "                      |
| -18         | Cyclohexanone             | "                      |
| -19         | Dichloroethane            | "                      |
| -20         | Dichloropropylene (PDC)   | "                      |
| -21         | Diethyl Ether             | "                      |
| -22         | Diethylamine              | "                      |
| -23         | Diisopropyl Ether         | "                      |
| -24         | 1,4-Dioxane               | "                      |
| -25         | Dipropyl Ether            | "                      |
| -26         | Ethyl Acetate             | "                      |
| -27         | Ethyl Acrylate            | "                      |
| -28         | Ethyl Alcohol             | "                      |
| -29         | Ethyl Benzene             | "                      |
| -30         | Ethylene                  | "                      |
| -31         | 1,2-Ethylene Dichloride   | "                      |
| -32         | Ethylene Oxide            | "                      |
| -33         | Freon 11                  | "                      |
| -34         | Isoprene                  | "                      |
| -35         | Isocyanates               | "                      |
| -36         | Methacrylonitrile         | "                      |
| -37         | Methyl Acetate            | "                      |
| -38         | Methyl Acrylate           | "                      |
| -39         | Methyl Alcohol            | "                      |
| -40         | Methylcyclohexane         | "                      |
| -41         | Methylcyclopentane        | "                      |
| -42         | Methylene Chloride        | "                      |
| -43         | Methyl Ethyl Ketone       | "                      |
| -44         | Methyl Methacrylate (MMA) | "                      |
| -45         | Methyl Propyl Ether       | "                      |
| -46         | Nitromethane              | "                      |
| -47         | Phenol                    | "                      |
| -48         | Propane Dichloride        | "                      |
| -49         | Propionaldehyde           | "                      |

POINT SOURCE EVAPORATION - PETROCHEMICAL STORAGE continued

|                                    |                       | <u>Units</u>           |
|------------------------------------|-----------------------|------------------------|
| Fixed Roof - Breathing (continued) |                       |                        |
| 4-04-001-50                        | isoPropyl Alcohol     | 1000 Gal Stge Capacity |
| -51                                | nPropylamine          | "                      |
| -52                                | Propylene Oxide       | "                      |
| -53                                | Styrene               | "                      |
| -54                                | Tetrahydrofuran       | "                      |
| -55                                | 1,1,1-Trichloroethane | "                      |
| -56                                | Trichloroethylene     | "                      |
| -57                                | Trichloropropylene    | "                      |
| -58                                | Vinyl Acetate         | "                      |
| -59                                | Vinyl Chloride        | "                      |
| -60                                | Vinylidene Chloride   | "                      |
| -61                                | Xylene                | "                      |
| -99                                | Other/Not Classified  | "                      |

Fixed Roof - Working

|             |                         |                     |
|-------------|-------------------------|---------------------|
| 4-04-005-01 | Acetaldehyde            | 1000 Gal Throughput |
| -02         | Acetic Acid             | "                   |
| -03         | Acetic Anhydride        | "                   |
| -04         | Acetone                 | "                   |
| -05         | Acetonitrile            | "                   |
| -06         | Acrylonitrile           | "                   |
| -07         | Allyl Alcohol           | "                   |
| -08         | Allyl Chloride          | "                   |
| -09         | Butadiene               | "                   |
| -10         | secButyl Alcohol        | "                   |
| -11         | isoButyl Alcohol        | "                   |
| -12         | tertButyl Alcohol       | "                   |
| -13         | nButyl Chloride         | "                   |
| -14         | Carbon Tetrachloride    | "                   |
| -15         | Chloroform              | "                   |
| -16         | Chloroprene             | "                   |
| -17         | Cumene                  | "                   |
| -18         | Cyclohexanone           | "                   |
| -19         | Dichloroethane          | "                   |
| -20         | Dichloropropylene (PDC) | "                   |
| -21         | Diethyl Ether           | "                   |
| -22         | Diethylamine            | "                   |
| -23         | Diisopropyl Ether       | "                   |
| -24         | 1,4-Dioxane             | "                   |
| -25         | Dipropyl Ether          | "                   |
| -26         | Ethyl Acetate           | "                   |
| -27         | Ethyl Acrylate          | "                   |
| -28         | Ethyl Alcohol           | "                   |
| -29         | Ethyl Benzene           | "                   |
| -30         | Ethylene                | "                   |
| -31         | 1,2-Ethylene Dichloride | "                   |
| -32         | Ethylene Oxide          | "                   |

POINT SOURCE EVAPORATION - PETROCHEMICAL STORAGE continued

|                                  |                           | <u>Units</u>        |
|----------------------------------|---------------------------|---------------------|
| Fixed Roof - Working (continued) |                           |                     |
| 4-04-005-33                      | Freon 11                  | 1000 Gal Throughput |
| -34                              | Isoprene                  | "                   |
| -35                              | Isocyanates               | "                   |
| -36                              | Methacrylonitrile         | "                   |
| -37                              | Methyl Acetate            | "                   |
| -38                              | Methyl Acrylate           | "                   |
| -39                              | Methyl Alcohol            | "                   |
| -40                              | Methylcyclohexane         | "                   |
| -41                              | Methylcyclopentane        | "                   |
| -42                              | Methylene Chloride        | "                   |
| -43                              | Methyl Ethyl Ketone       | "                   |
| -44                              | Methyl Methacrylate (MMA) | "                   |
| -45                              | Methyl Propyl Ether       | "                   |
| -46                              | Nitromethane              | "                   |
| -47                              | Phenol                    | "                   |
| -48                              | Propane Dichloride        | "                   |
| -49                              | Propionaldehyde           | "                   |
| -50                              | isoPropyl Alcohol         | "                   |
| -51                              | nPropylamine              | "                   |
| -52                              | Propylene Oxide           | "                   |
| -53                              | Styrene                   | "                   |
| -54                              | Tetrahydrofuran           | "                   |
| -55                              | 1,1,1-Trichloroethane     | "                   |
| -56                              | Trichloroethylene         | "                   |
| -57                              | Trichloropropylene        | "                   |
| -58                              | Vinyl Acetate             | "                   |
| -59                              | Vinyl Chloride            | "                   |
| -60                              | Vinylidene Chloride       | "                   |
| -61                              | Xylene                    | "                   |
| -99                              | Other/Not Classified      | "                   |

Floating Roof - Standing

|             |                      |                        |
|-------------|----------------------|------------------------|
| 4-04-010-01 | Acetaldehyde         | 1000 Gal Stge Capacity |
| -02         | Acetic Acid          | "                      |
| -03         | Acetic Anhydride     | "                      |
| -04         | Acetone              | "                      |
| -05         | Acetonitrile         | "                      |
| -06         | Acrylonitrile        | "                      |
| -07         | Allyl Alcohol        | "                      |
| -08         | Allyl Chloride       | "                      |
| -09         | Butadiene            | "                      |
| -10         | secButyl Alcohol     | "                      |
| -11         | isoButyl Alcohol     | "                      |
| -12         | tertButyl Alcohol    | "                      |
| -13         | nButyl Chloride      | "                      |
| -14         | Carbon Tetrachloride | "                      |
| -15         | Chloroform           | "                      |

POINT SOURCE EVAPORATION - PETROCHEMICAL STORAGE continued

|                                      |                           | <u>Units</u>           |
|--------------------------------------|---------------------------|------------------------|
| Floating Roof - Standing (continued) |                           |                        |
| 4-04-010-16                          | Chloroprene               | 1000 Gal Stge Capacity |
| -17                                  | Cumene                    | "                      |
| -18                                  | Cyclohexanone             | "                      |
| -19                                  | Dichloroethane            | "                      |
| -20                                  | Dichloropropylene (PDC)   | "                      |
| -21                                  | Diethyl Ether             | "                      |
| -22                                  | Diethylamine              | "                      |
| -23                                  | Diisopropyl Ether         | "                      |
| -24                                  | 1,4-Dioxane               | "                      |
| -25                                  | Dipropyl Ether            | "                      |
| -26                                  | Ethyl Acetate             | "                      |
| -27                                  | Ethyl Acrylate            | "                      |
| -28                                  | Ethyl Alcohol             | "                      |
| -29                                  | Ethyl Benzene             | "                      |
| -30                                  | Ethylene                  | "                      |
| -31                                  | 1,2-Ethylene Dichloride   | "                      |
| -32                                  | Ethylene Oxide            | "                      |
| -33                                  | Freon 11                  | "                      |
| -34                                  | Isoprene                  | "                      |
| -35                                  | Isocyanates               | "                      |
| -36                                  | Methacrylonitrile         | "                      |
| -37                                  | Methyl Acetate            | "                      |
| -38                                  | Methyl Acrylate           | "                      |
| -39                                  | Methyl Alcohol            | "                      |
| -40                                  | Methylcyclohexane         | "                      |
| -41                                  | Methylcyclopentane        | "                      |
| -42                                  | Methylene Chloride        | "                      |
| -43                                  | Methyl Ethyl Ketone       | "                      |
| -44                                  | Methyl Methacrylate (MMA) | "                      |
| -45                                  | Methyl Propyl Ether       | "                      |
| -46                                  | Nitromethane              | "                      |
| -47                                  | Phenol                    | "                      |
| -48                                  | Propane Dichloride        | "                      |
| -49                                  | Propionaldehyde           | "                      |
| -50                                  | isoPropyl Alcohol         | "                      |
| -51                                  | nPropylamine              | "                      |
| -52                                  | Propylene Oxide           | "                      |
| -53                                  | Styrene                   | "                      |
| -54                                  | Tetrahydrofuran           | "                      |
| -55                                  | 1,1,1-Trichloroethane     | "                      |
| -56                                  | Trichloroethylene         | "                      |
| -57                                  | Trichloropropylene        | "                      |
| -58                                  | Vinyl Acetate             | "                      |
| -59                                  | Vinyl Chloride            | "                      |
| -60                                  | Vinylidene Chloride       | "                      |
| -61                                  | Xylene                    | "                      |
| -99                                  | Other/Not Classified      | "                      |

98<

Other/Not Classified

4-04-999-99 Specify in Remark

1000 Gal Stored

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRANSPORTATION

|                                |                       | <u>Units</u>         |
|--------------------------------|-----------------------|----------------------|
| Tank Cars/Trucks - Splash Load |                       |                      |
| 4-10-001-01                    | Acetaldehyde          | 1000 Gal Transferred |
| -02                            | Acetone               | "                    |
| -03                            | Acetonitrile          | "                    |
| -04                            | Acrylonitrile         | "                    |
| -05                            | Allyl Alcohol         | "                    |
| -06                            | Allyl Chloride        | "                    |
| -07                            | isoButyl Alcohol      | "                    |
| -08                            | tertButyl Alcohol     | "                    |
| -09                            | nButyl Chloride       | "                    |
| -10                            | Carbon Tetrachloride  | "                    |
| -11                            | Chloroform            | "                    |
| -12                            | Chloroprene           | "                    |
| -13                            | Cumene                | "                    |
| -14                            | Cyclohexanone         | "                    |
| -15                            | Cyclopentane          | "                    |
| -16                            | Dichloroethane        | "                    |
| -17                            | 1,2-Dichloroethylene  | "                    |
| -18                            | Diethyl Ether         | "                    |
| -19                            | Diethylamine          | "                    |
| -20                            | Diisopropyl Ether     | "                    |
| -21                            | 1,4-Dioxane           | "                    |
| -22                            | Dipropyl Ether        | "                    |
| -23                            | Ethyl Acetate         | "                    |
| -24                            | Ethyl Alcohol         | "                    |
| -25                            | Ethylbenzene          | "                    |
| -26                            | Freon 11              | "                    |
| -27                            | Heptane               | "                    |
| -28                            | Hexane                | "                    |
| -29                            | Isoprene              | "                    |
| -30                            | Methacrylonitrile     | "                    |
| -31                            | Methyl Acetate        | "                    |
| -32                            | Methyl Alcohol        | "                    |
| -33                            | Methylcyclohexane     | "                    |
| -34                            | Methylcyclopentane    | "                    |
| -35                            | Methylene Chloride    | "                    |
| -36                            | Methyl Ethyl Ketone   | "                    |
| -37                            | Methyl Propyl Ether   | "                    |
| -38                            | Nitromethane          | "                    |
| -39                            | isoOctane             | "                    |
| -40                            | Pentane               | "                    |
| -41                            | isoPentane            | "                    |
| -42                            | nPropylamine          | "                    |
| -43                            | isoPropyl Alcohol     | "                    |
| -44                            | Styrene               | "                    |
| -45                            | Toluene               | "                    |
| -46                            | 1,1,1-Trichloroethane | "                    |
| -47                            | Trichloroethylene     | "                    |
| -48                            | Vinyl Acetate         | "                    |
| -49                            | Vinyl Chloride        | "                    |
| -50                            | Vinylidene Chloride   | "                    |
| -51                            | Xylene                | "                    |
| -99                            | Other/Not Classified  | "                    |

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRANSPORTATION continued

|                                   |                       | <u>Units</u>         |
|-----------------------------------|-----------------------|----------------------|
| Tank Cars/Trucks - Submerged Load |                       |                      |
| 4-10-005-01                       | Acetaldehyde          | 1000 Gal Transferred |
| -02                               | Acetone               | "                    |
| -03                               | Acetonitrile          | "                    |
| -04                               | Acrylonitrile         | "                    |
| -05                               | Allyl Alcohol         | "                    |
| -06                               | Allyl Chloride        | "                    |
| -07                               | isoButyl Alcohol      | "                    |
| -08                               | tertButyl Alcohol     | "                    |
| -09                               | nButyl Chloride       | "                    |
| -10                               | Carbon Tetrachloride  | "                    |
| -11                               | Chloroform            | "                    |
| -12                               | Chloroprene           | "                    |
| -13                               | Cumene                | "                    |
| -14                               | Cyclohexanone         | "                    |
| -15                               | Cyclopentane          | "                    |
| -16                               | Dichloroethane        | "                    |
| -17                               | 1,2-Dichloroethylene  | "                    |
| -18                               | Diethyl Ether         | "                    |
| -19                               | Diethylamine          | "                    |
| -20                               | Diisopropyl Ether     | "                    |
| -21                               | 1,4-Dioxane           | "                    |
| -22                               | Dipropyl Ether        | "                    |
| -23                               | Ethyl Acetate         | "                    |
| -24                               | Ethyl Alcohol         | "                    |
| -25                               | Ethylbenzene          | "                    |
| -26                               | Freon 11              | "                    |
| -27                               | Heptane               | "                    |
| -28                               | Hexane                | "                    |
| -29                               | Isoprene              | "                    |
| -30                               | Methacrylonitrile     | "                    |
| -31                               | Methyl Acetate        | "                    |
| -32                               | Methyl Alcohol        | "                    |
| -33                               | Methylcyclohexane     | "                    |
| -34                               | Methylcyclopentane    | "                    |
| -35                               | Methylene Chloride    | "                    |
| -36                               | Methyl Ethyl Ketone   | "                    |
| -37                               | Methyl Propyl Ether   | "                    |
| -38                               | Nitromethane          | "                    |
| -39                               | isoOctane             | "                    |
| -40                               | Pentane               | "                    |
| -41                               | isoPentane            | "                    |
| -42                               | nPropylamine          | "                    |
| -43                               | isoPropyl Alcohol     | "                    |
| -44                               | Styrene               | "                    |
| -45                               | Toluene               | "                    |
| -46                               | 1,1,1-Trichloroethane | "                    |
| -47                               | Trichloroethylene     | "                    |
| -48                               | Vinyl Acetate         | "                    |
| -49                               | Vinyl Chloride        | "                    |
| -50                               | Vinylidene Chloride   | "                    |
| -51                               | Xylene                | "                    |
| -99                               | Other/Not Classified  | "                    |

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRANSPORTATION continued

|                           |                       | <u>Units</u>         |
|---------------------------|-----------------------|----------------------|
| Tank Cars/Trucks - Unload |                       |                      |
| 4-10-010-01               | Acetaldehyde          | 1000 Gal Transferred |
| -02                       | Acetone               | "                    |
| -03                       | Acetonitrile          | "                    |
| -04                       | Acrylonitrile         | "                    |
| -05                       | Allyl Alcohol         | "                    |
| -06                       | Allyl Chloride        | "                    |
| -07                       | isoButyl Alcohol      | "                    |
| -08                       | tertButyl Alcohol     | "                    |
| -09                       | nButyl Chloride       | "                    |
| -10                       | Carbon Tetrachloride  | "                    |
| -11                       | Chloroform            | "                    |
| -12                       | Chloroprene           | "                    |
| -13                       | Cumene                | "                    |
| -14                       | Cyclohexanone         | "                    |
| -15                       | Cyclopentane          | "                    |
| -16                       | Dichloroethane        | "                    |
| -17                       | 1,2-Dichloroethylene  | "                    |
| -18                       | Diethyl Ether         | "                    |
| -19                       | Diethylamine          | "                    |
| -20                       | Diisopropyl Ether     | "                    |
| -21                       | 1,4-Dioxane           | "                    |
| -22                       | Dipropyl Ether        | "                    |
| -23                       | Ethyl Acetate         | "                    |
| -24                       | Ethyl Alcohol         | "                    |
| -25                       | Ethylbenzene          | "                    |
| -26                       | Freon 11              | "                    |
| -27                       | Heptane               | "                    |
| -28                       | Hexane                | "                    |
| -29                       | Isoprene              | "                    |
| -30                       | Methacrylonitrile     | "                    |
| -31                       | Methyl Acetate        | "                    |
| -32                       | Methyl Alcohol        | "                    |
| -33                       | Methylcyclohexane     | "                    |
| -34                       | Methylcyclopentane    | "                    |
| -35                       | Methylene Chloride    | "                    |
| -36                       | Methyl Ethyl Ketone   | "                    |
| -37                       | Methyl Propyl Ether   | "                    |
| -38                       | Nitromethane          | "                    |
| -39                       | isoOctane             | "                    |
| -40                       | Pentane               | "                    |
| -41                       | isoPentane            | "                    |
| -42                       | nPropylamine          | "                    |
| -43                       | isoPropyl Alcohol     | "                    |
| -44                       | Styrene               | "                    |
| -45                       | Toluene               | "                    |
| -46                       | 1,1,1-Trichloroethane | "                    |
| -47                       | Trichloroethylene     | "                    |
| -48                       | Vinyl Acetate         | "                    |
| -49                       | Vinyl Chloride        | "                    |
| -50                       | Vinylidene Chloride   | "                    |
| -51                       | Xylene                | "                    |
| -99                       | Other/Not Classified  | "                    |

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRANSPORTATION continued

|                       |                       | <u>Units</u>         |
|-----------------------|-----------------------|----------------------|
| Marine Vessels - Load |                       |                      |
| 4-10-015-01           | Acetaldehyde          | 1000 Gal Transferred |
| -02                   | Acetone               | "                    |
| -03                   | Acetonitrile          | "                    |
| -04                   | Acrylonitrile         | "                    |
| -05                   | Allyl Alcohol         | "                    |
| -06                   | Allyl Chloride        | "                    |
| -07                   | isoButyl Alcohol      | "                    |
| -08                   | tertButyl Alcohol     | "                    |
| -09                   | nButyl Chloride       | "                    |
| -10                   | Carbon Tetrachloride  | "                    |
| -11                   | Chloroform            | "                    |
| -12                   | Chloroprene           | "                    |
| -13                   | Cumene                | "                    |
| -14                   | Cyclohexanone         | "                    |
| -15                   | Cyclopentane          | "                    |
| -16                   | Dichloroethane        | "                    |
| -17                   | 1,2-Dichloroethylene  | "                    |
| -18                   | Diethyl Ether         | "                    |
| -19                   | Diethylamine          | "                    |
| -20                   | Diisopropyl Ether     | "                    |
| -21                   | 1,4-Dioxane           | "                    |
| -22                   | Dipropyl Ether        | "                    |
| -23                   | Ethyl Acetate         | "                    |
| -24                   | Ethyl Alcohol         | "                    |
| -25                   | Ethylbenzene          | "                    |
| -26                   | Freon 11              | "                    |
| -27                   | Heptane               | "                    |
| -28                   | Hexane                | "                    |
| -29                   | Isoprene              | "                    |
| -30                   | Methacrylonitrile     | "                    |
| -31                   | Methyl Acetate        | "                    |
| -32                   | Methyl Alcohol        | "                    |
| -33                   | Methylcyclohexane     | "                    |
| -34                   | Methylcyclopentane    | "                    |
| -35                   | Methylene Chloride    | "                    |
| -36                   | Methyl Ethyl Ketone   | "                    |
| -37                   | Methyl Propyl Ether   | "                    |
| -38                   | Nitromethane          | "                    |
| -39                   | isoOctane             | "                    |
| -40                   | Pentane               | "                    |
| -41                   | isoPentane            | "                    |
| -42                   | nPropylamine          | "                    |
| -43                   | isoPropyl Alcohol     | "                    |
| -44                   | Styrene               | "                    |
| -45                   | Toluene               | "                    |
| -46                   | 1,1,1-Trichloroethane | "                    |
| -47                   | Trichloroethylene     | "                    |
| -48                   | Vinyl Acetate         | "                    |
| -49                   | Vinyl Chloride        | "                    |
| -50                   | Vinylidene Chloride   | "                    |
| -51                   | Xylene                | "                    |
| -99                   | Other/Not Classified  | "                    |

POINT SOURCE EVAPORATION - PETROCHEMICAL MARKETING & TRANSPORTATION continued

| Marine Vessels - Unload   | Units                |
|---------------------------|----------------------|
| 4-10-020-01 Acetaldehyde  | 1000 Gal Transferred |
| -02 Acetone               | "                    |
| -03 Acetonitrile          | "                    |
| -04 Acrylonitrile         | "                    |
| -05 Allyl Alcohol         | "                    |
| -06 Allyl Chloride        | "                    |
| -07 isoButyl Alcohol      | "                    |
| -08 tertButyl Alcohol     | "                    |
| -09 nButyl Chloride       | "                    |
| -10 Carbon Tetrachloride  | "                    |
| -11 Chloroform            | "                    |
| -12 Chloroprene           | "                    |
| -13 Cumene                | "                    |
| -14 Cyclohexanone         | "                    |
| -15 Cyclopentane          | "                    |
| -16 Dichloroethane        | "                    |
| -17 1,2-Dichloroethylene  | "                    |
| -18 Diethyl Ether         | "                    |
| -19 Diethylamine          | "                    |
| -20 Diisopropyl Ether     | "                    |
| -21 1,4-Dioxane           | "                    |
| -22 Dipropyl Ether        | "                    |
| -23 Ethyl Acetate         | "                    |
| -24 Ethyl Alcohol         | "                    |
| -25 Ethylbenzene          | "                    |
| -26 Freon 11              | "                    |
| -27 Heptane               | "                    |
| -28 Hexane                | "                    |
| -29 Isoprene              | "                    |
| -30 Methacrylonitrile     | "                    |
| -31 Methyl Acetate        | "                    |
| -32 Methyl Alcohol        | "                    |
| -33 Methylcyclohexane     | "                    |
| -34 Methylcyclopentane    | "                    |
| -35 Methylene Chloride    | "                    |
| -36 Methyl Ethyl Ketone   | "                    |
| -37 Methyl Propyl Ether   | "                    |
| -38 Nitromethane          | "                    |
| -39 isoOctane             | "                    |
| -40 Pentane               | "                    |
| -41 isoPentane            | "                    |
| -42 nPropylamine          | "                    |
| -43 isoPropyl Alcohol     | "                    |
| -44 Styrene               | "                    |
| -45 Toluene               | "                    |
| -46 1,1,1-Trichloroethane | "                    |
| -47 Trichloroethylene     | "                    |
| -48 Vinyl Acetate         | "                    |
| -49 Vinyl Chloride        | "                    |
| -50 Vinylidene Chloride   | "                    |
| -51 Xylene                | "                    |
| -99 Other/Not Classified  | "                    |

APPENDIX B  
CODES PROPOSED BY RADIAN

1 Symbols in the far right hand column of the Source Classification Code tables indicate the action taken to revise each code. These symbols represent the following actions:

| <u>Symbol</u> | <u>Action</u>                                                                      |
|---------------|------------------------------------------------------------------------------------|
| *             | No changes were made to the existing EPA SCC.                                      |
| +             | No changes were made to the newly added TACB (Texas Air Control Board) SCC.        |
| 1             | Both the source title and emission factor were changed for an existing EPA SCC.    |
| 2             | Both the source title and emission factor were changed for a newly added TACB SCC. |
| 3             | A new SCC was added.                                                               |
| 4             | Only the emission factor was changed for an existing EPA SCC.                      |
| 5             | Only the emission factor was changed for a newly added TACB SCC.                   |

REVISED SCC LISTINGS

| Fixed Roof  | Source                          | Part | SO <sub>x</sub> | NO <sub>x</sub> | HC    | CO | Units                      | Action |
|-------------|---------------------------------|------|-----------------|-----------------|-------|----|----------------------------|--------|
| 4-03-001-01 | Breath-Gasoline < 100,000 bbl   | 0    | 0               | 0               | 84.0  | 0  | 1000 gal. storage capacity | 1      |
| 4-03-001-02 | Breath-Crude < 100,000 bbl      | 0    | 0               | 0               | 20.8  | 0  | 1000 gal. storage capacity | 1      |
| 4-03-001-03 | Working-Gasoline                | 0    | 0               | 0               | 8.2   | 0  | 1000 gal. throughput       | 4      |
| 4-03-001-04 | Working-Crude                   | 0    | 0               | 0               | 2.5   | 0  | 1000 gal. throughput       | 4      |
| 4-03-001-05 | Breath-JP-4 < 100,000 bbl       | 0    | 0               | 0               | 31.4  | 0  | 1000 gal. storage capacity | 1      |
| 4-03-001-06 | Breath-Jet Kero < 100,000 bbl   | 0    | 0               | 0               | 1.6   | 0  | " "                        | 1      |
| 4-03-001-07 | Breath-Dist No. 2 < 100,000 bbl | 0    | 0               | 0               | 1.4   | 0  | " "                        | 1      |
| 4-03-001-08 | Breath-Benzene                  | 0    | 0               | 0               | 28.8  | 0  | " "                        | 4      |
| 4-03-001-09 | Breath-Cyclohexane              | 0    | 0               | 0               | 31.0  | 0  | " "                        | 4      |
| 4-03-001-10 | Breath-Cyclopentane             | 0    | 0               | 0               | 58.4  | 0  | " "                        | *      |
| 4-03-001-11 | Breath-Heptane                  | 0    | 0               | 0               | 11.3  | 0  | " "                        | *      |
| 4-03-001-12 | Breath-Hexane                   | 0    | 0               | 0               | 32.1  | 0  | " "                        | *      |
| 4-03-001-13 | Breath-Isooctane                | 0    | 0               | 0               | 13.9  | 0  | " "                        | *      |
| 4-03-001-14 | Breath-Isopentane               | 0    | 0               | 0               | 142.0 | 0  | " "                        | *      |
| 4-03-001-15 | Breath-Pentane                  | 0    | 0               | 0               | 94.9  | 0  | " "                        | *      |
| 4-03-001-16 | Breath-Toluene                  | 0    | 0               | 0               | 12.8  | 0  | " "                        | 4      |
| 4-03-001-17 | Breath-Naphtha                  | 0    | 0               | 0               |       | 0  | " "                        | +      |
| 4-03-001-18 | Breath-Reformate                | 0    | 0               | 0               |       | 0  | " "                        | +      |
| 4-03-001-19 | Breath-Alkylate                 | 0    | 0               | 0               |       | 0  | " "                        | +      |
| 4-03-001-20 | Breath-Gas Oil                  | 0    | 0               | 0               |       | 0  | " "                        | +      |
| 4-03-001-21 | Breath-Resid No. <100,000 bbl   | 0    | 0               | 0               | 0.06  | 0  | " "                        | 2      |
| 4-03-001-22 | Breath-LPG                      | 0    | 0               | 0               |       | 0  | " "                        | +      |
| 4-03-001-23 | Breath-Gasoline > 100,000 bbl   | 0    | 0               | 0               | 62.1  | 0  | " "                        | 3      |
| 4-02-001-24 | Breath-Crude > 100,000 bbl      | 0    | 0               | 0               | 15.0  | 0  | " "                        | 3      |
| 4-02-001-25 | Breath-JP-4 > 100,000 bbl       | 0    | 0               | 0               | 22.6  | 0  | " "                        | 3      |

## REVISED SCC LISTING

| Fixed Roof (cont.) | Source                           | Part | SO | NO | HC     | CO | Units                      | Action |
|--------------------|----------------------------------|------|----|----|--------|----|----------------------------|--------|
| 4-03-001-26        | Breath-Jet Kero > 100,000 bbl    | 0    | 0  | 0  | 1.1    | 0  | 1000 gal. storage capacity | 3      |
| 4-03-001-27        | Breath-Dist No. 2 > 100,000 bbl  | 0    | 0  | 0  | 0.10   | 0  | " " "                      | 3      |
| 4-03-001-28        | Breath-Resid No. 6 > 100,000 bbl | 0    | 0  | 0  | 0.005  | 0  | " " "                      | 3      |
| 4-03-001-50        | Working-JP-4                     | 0    | 0  | 0  | 2.5    | 0  | 1000 gal. throughput       | 1      |
| 4-03-001-51        | Working-Jet Kero                 | 0    | 0  | 0  | 0.027  | 0  | " " "                      | 1      |
| 4-03-001-52        | Working-Dist No. 2               | 0    | 0  | 0  | 0.023  | 0  | " " "                      | 4      |
| 4-03-001-53        | Working-Benzene                  | 0    | 0  | 0  | 2.2    | 0  | " " "                      | 4      |
| 4-03-001-54        | Working-Cyclohex                 | 0    | 0  | 0  | 2.4    | 0  | " " "                      | 4      |
| 4-03-001-55        | Working-Cyclopent                | 0    | 0  | 0  | 6.40   | 0  | " " "                      | 4      |
| 4-03-001-56        | Working-Heptane                  | 0    | 0  | 0  | 1.20   | 0  | " " "                      | *      |
| 4-03-001-57        | Working-Helexane                 | 0    | 0  | 0  | 3.60   | 0  | " " "                      | *      |
| 4-03-001-58        | Working-Isooctane                | 0    | 0  | 0  | 1.50   | 0  | " " "                      | *      |
| 4-03-001-59        | Working-Isopent                  | 0    | 0  | 0  | 15.7   | 0  | " " "                      | *      |
| 4-03-001-60        | Working-Pentane                  | 0    | 0  | 0  | 10.6   | 0  | " " "                      | *      |
| 4-03-001-61        | Working-Toluene                  | 0    | 0  | 0  | 0.66   | 0  | " " "                      | 4      |
| 4-03-001-62        | Working-Naphtha                  | 0    | 0  | 0  |        | 0  | " " "                      | +      |
| 4-03-001-63        | Working-Reformate                | 0    | 0  | 0  |        | 0  | " " "                      | +      |
| 4-03-001-64        | Working-Alkylate                 | 0    | 0  | 0  |        | 0  | " " "                      | +      |
| 4-03-001-65        | Working-Gas Oil                  | 0    | 0  | 0  |        | 0  | " " "                      | +      |
| 4-03-001-66        | Working-Resid No. 6              | 0    | 0  | 0  | 0.0002 | 0  | " " "                      | 5      |
| 4-03-001-67        | Working-LPG                      | 0    | 0  | 0  |        | 0  | " " "                      | +      |
| 4-03-001-98        | Breath Specify                   |      |    |    |        |    | 1000 gal. storage capacity | *      |
| 4-03-001-99        | Working Specify                  |      |    |    |        |    | 1000 gal. throughput       | *      |

REVISED SCC LISTINGS

| <u>Floating Roof</u> | <u>Source</u>                       | <u>Part</u> | <u>SO<sub>x</sub></u> | <u>NO<sub>x</sub></u> | <u>HC</u> | <u>CO</u> | <u>Units</u>              | <u>Action</u> |
|----------------------|-------------------------------------|-------------|-----------------------|-----------------------|-----------|-----------|---------------------------|---------------|
| 4-03-002-01          | Standing STG-Gasoline <100,000 bbl  | 0           | 0                     | 0                     | 12.0      | 0         | 1000 gal storage capacity | 1             |
| 4-03-002-02          | Working-Gasoline <100,000 bbl       | 0           | 0                     | 0                     | 0.023     | 0         | 1000 gal throughput       | 1             |
| 4-03-002-03          | Standing STG-Crude <100,000 bbl     | 0           | 0                     | 0                     | 3.65      | 0         | 1000 gal storage capacity | 1             |
| 4-03-002-04          | Working-Crude                       | 0           | 0                     | 0                     |           | 0         | 1000 gal throughput       | *             |
| 4-03-002-05          | Standing STG-JP-4 <100,000 bbl      | 0           | 0                     | 0                     | 4.38      | 0         | 1000 gal storage capacity | 1             |
| 4-03-002-06          | Standing STG-Jet Kero <100,000 bbl  | 0           | 0                     | 0                     | 0.197     | 0         | " "                       | 1             |
| 4-03-002-07          | Standing STG-Dist.No.2 <100,000 bbl | 0           | 0                     | 0                     | 0.179     | 0         | " "                       | 1             |
| 4-03-002-08          | Standing STG-Benzene                | 0           | 0                     | 0                     | 4.02      | 0         | " "                       | 4             |
| 4-03-002-09          | Standing STG-Cyclohex               | 0           | 0                     | 0                     | 4.38      | 0         | " "                       | 4             |
| 4-03-002-10          | Standing STG-Cyclophen              | 0           | 0                     | 0                     | 8.76      | 0         | " "                       | *             |
| 4-03-002-11          | Standing STG-Heptane                | 0           | 0                     | 0                     | 1.64      | 0         | " "                       | *             |
| 4-03-002-12          | Standing STG-Hexane                 | 0           | 0                     | 0                     | 4.75      | 0         | " "                       | *             |
| 4-03-002-13          | Standing STG-Isooctane              | 0           | 0                     | 0                     | 2.01      | 0         | " "                       | *             |
| 4-03-002-14          | Standing STG-Isopentane             | 0           | 0                     | 0                     | 20.8      | 0         | " "                       | *             |
| 4-03-002-15          | Standing STG-Pentane                | 0           | 0                     | 0                     | 13.9      | 0         | " "                       | *             |
| 4-03-002-16          | Standing STG-Toluene                | 0           | 0                     | 0                     | 1.75      | 0         | " "                       | 4             |
| 4-03-002-17          | Standing STG-Naphtha                | 0           | 0                     | 0                     |           | 0         | " "                       | +             |
| 4-03-002-18          | Standing STG-Reformate              | 0           | 0                     | 0                     |           | 0         | " "                       | +             |
| 4-03-002-19          | Standing STG-Alkylate               | 0           | 0                     | 0                     |           | 0         | " "                       | +             |
| 4-03-002-20          | Standing STG-Gas Oil                | 0           | 0                     | 0                     |           | 0         | " "                       | +             |

## REVISED SCC LISTINGS

| <u>Floating Roof Cont.</u> | <u>Source</u>                            | <u>Part</u> | <u>SO</u> <sub>x</sub> | <u>NO</u> <sub>x</sub> | <u>HC</u> | <u>CO</u> | <u>Units</u>              | <u>Action</u> |
|----------------------------|------------------------------------------|-------------|------------------------|------------------------|-----------|-----------|---------------------------|---------------|
| 4-03-002-21                | Standing STG-Resid No. 6<br><100,000 bbl | 0           | 0                      | 0                      | 0.007     | 0         | 1000 gal storage capacity | 2             |
| 4-03-002-22                | Standing STG-Gasoline<br>>100,000 bbl    | 0           | 0                      | 0                      | 6.94      | 0         | "                         | 3             |
| 4-03-002-23                | Working-Gasoline >100,000 bbl            | 0           | 0                      | 0                      | 0.013     | 0         | 1000 gal throughput       | 3             |
| 4-03-002-24                | Standing STG-Crude >100,000 bbl          | 0           | 0                      | 0                      | 2.08      | 0         | 1000 gal storage capacity | 3             |
| 4-03-002-25                | Standing STG-JP-4 >100,000 bbl           | 0           | 0                      | 0                      | 2.48      | 0         | "                         | 3             |
| 4-03-002-26                | Standing STG-Jet Kero >100,000 bbl       | 0           | 0                      | 0                      | 0.113     | 0         | "                         | 3             |
| 4-03-002-27                | Standing STG-Dist. No. 2<br>>100,000 bbl | 0           | 0                      | 0                      | 0.102     | 0         | "                         | 3             |
| 4-03-002-28                | Standing STG-Resid No. 6<br>>100,000 bbl | 0           | 0                      | 0                      | 0.004     | 0         | "                         | 3             |
| 4-03-002-99                | Standing STG-Capacity                    | 0           | 0                      | 0                      |           | 0         | "                         | *             |

REVISED SCC LISTINGS Continued

| Variable Vapor Space | Source              | Part. | SO <sub>x</sub> | NO <sub>x</sub> | HC     | CO | Units<br>1000 gal throughput | Action |
|----------------------|---------------------|-------|-----------------|-----------------|--------|----|------------------------------|--------|
| 4-03-003-02          | Working-Gasoline    | 0     | 0               | 0               | 7.7    | 0  | "                            | 4      |
| 4-03-003-03          | Working-JP-4        | 0     | 0               | 0               | 2.3    | 0  | "                            | 1      |
| 4-03-003-04          | Working-Jet Kero    | 0     | 0               | 0               | 0.025  | 0  | "                            | 1      |
| 4-03-003-05          | Working-Dist. No. 2 | 0     | 0               | 0               | 0.022  | 0  | "                            | 4      |
| 4-03-003-06          | Working-Benzene     | 0     | 0               | 0               | 2.1    | 0  | "                            | 4      |
| 4-03-003-07          | Working-Cyclohex    | 0     | 0               | 0               | 2.3    | 0  | "                            | 4      |
| 4-03-003-08          | Working-Cyclopent   | 0     | 0               | 0               | 7.2    | 0  | "                            | *      |
| 4-03-003-09          | Working-Heptane     | 0     | 0               | 0               | 1.4    | 0  | "                            | *      |
| 4-03-003-10          | Working-Hexane      | 0     | 0               | 0               | 4.0    | 0  | "                            | *      |
| 4-03-003-11          | Working-Isooctane   | 0     | 0               | 0               | 1.7    | 0  | "                            | *      |
| 4-03-003-12          | Working-Isopentane  | 0     | 0               | 0               | 17.8   | 0  | "                            | *      |
| 4-03-003-13          | Working-Pentane     | 0     | 0               | 0               | 12.0   | 0  | "                            | *      |
| 4-03-003-14          | Working-Toluene     | 0     | 0               | 0               | 0.62   | 0  | "                            | 4      |
| 4-03-003-15          | Working-Resid No. 6 | 0     | 0               | 0               | 0.0002 | 0  | "                            | 3      |
| 4-03-003-99          | Working-Specify     | 0     | 0               | 0               |        | 0  | "                            | *      |

## REVISED SCC LISTINGS Continued

| Fixed Roof Breathing<br>(Petrochemical) | Source                            | Part. | SO <sub>x</sub> | NO <sub>x</sub> | HC   | CO | Units                     | Activity |
|-----------------------------------------|-----------------------------------|-------|-----------------|-----------------|------|----|---------------------------|----------|
| 4-04-001-04                             | Breath-Acetone                    | 0     | 0               | 0               | 43.8 | 0  | 1000 gal storage capacity | 5        |
| 4-04-001-06                             | Breath-Acrylonitrile              | 0     | 0               | 0               | 21.9 | 0  | " "                       | 5        |
| 4-04-001-14                             | Breath-Carbon Tetra-<br>chloride  | 0     | 0               | 0               | 62.1 | 0  | " "                       | 5        |
| 4-04-001-15                             | Breath-Chloroform                 | 0     | 0               | 0               | 76.7 | 0  | " "                       | 5        |
| 4-04-001-19                             | Breath-1,2-Dichloro-<br>ethane    | 0     | 0               | 0               | 31.8 | 0  | " "                       | 5        |
| 4-04-001-26                             | Breath-Ethylacetate               | 0     | 0               | 0               | 30.3 | 0  | " "                       | 5        |
| 4-04-001-28                             | Breath-Ethylalcohol               | 0     | 0               | 0               | 10.2 | 0  | " "                       | 5        |
| 4-04-001-39                             | Breath-Menthyl Alcohol            | 0     | 0               | 0               | 13.1 | 0  | " "                       | 5        |
| 4-04-001-42                             | Breath-Methylene<br>Chloride      | 0     | 0               | 0               | 113  | 0  | " "                       | 5        |
| 4-04-001-43                             | Breath-Methyl Ethyl<br>Ketone     | 0     | 0               | 0               | 26.6 | 0  | " "                       | 5        |
| 4-04-001-44                             | Breath-Methyl-<br>methacrylate    | 0     | 0               | 0               | 13.9 | 0  | " "                       | 5        |
| 4-04-001-50                             | Breath-Isopropyl-<br>alcohol      | 0     | 0               | 0               | 11.3 | 0  | " "                       | 5        |
| 4-04-001-55                             | Breath-1,1,1 Trichloro-<br>ethane | 0     | 0               | 0               | 62.1 | 0  | " "                       | 5        |
| 4-04-001-56                             | Breath-Trichloroethylene          | 0     | 0               | 0               | 40.2 | 0  | " "                       | 5        |
| 4-04-001-58                             | Breath-Vinyl Acetate              | 0     | 0               | 0               | 33.6 | 0  | " "                       | 5        |

REVISED SCC LISTINGS Continued

| Fixed Roof Working<br>(Petrochemical) | Sources                            | Part. | SO <sub>x</sub> | NO <sub>x</sub> | HCl  | CO | Units               | Activity |
|---------------------------------------|------------------------------------|-------|-----------------|-----------------|------|----|---------------------|----------|
| 4-04-005-04                           | Working-Acetone                    | 0     | 0               | 0               | 4.0  | 0  | 1000 gal throughput | 5        |
| 4-04-005-06                           | Working-Acrylonitrile              | 0     | 0               | 0               | 1.8  | 0  | "                   | 5        |
| 4-04-005-14                           | Working-Carbon tetra-<br>chloride  | 0     | 0               | 0               | 5.2  | 0  | "                   | 5        |
| 4-04-005-15                           | Working-Chloroform                 | 0     | 0               | 0               | 7.1  | 0  | "                   | 5        |
| 4-04-005-19                           | Working-1,2-Dichloro-<br>ethane    | 0     | 0               | 0               | 2.4  | 0  | "                   | 5        |
| 4-04-005-26                           | Working-Ethylacetate               | 0     | 0               | 0               | 2.3  | 0  | "                   | 5        |
| 4-04-005-28                           | Working-Ethylalcohol               | 0     | 0               | 0               | 0.66 | 0  | "                   | 5        |
| 4-04-005-39                           | Working-Methylalcohol              | 0     | 0               | 0               | 1.1  | 0  | "                   | 5        |
| 4-04-005-42                           | Working-Methylene Chloride         | 0     | 0               | 0               | 11.0 | 0  | "                   | 5        |
| 4-04-005-43                           | Working-Methyl Ethyl<br>Ketone     | 0     | 0               | 0               | 2.1  | 0  | "                   | 5        |
| 4-04-005-44                           | Working-Methylmeth-<br>acrylate    | 0     | 0               | 0               | 0.72 | 0  | "                   | 5        |
| 4-04-005-50                           | Working-Isopropyl Alcohol          | 0     | 0               | 0               | 0.72 | 0  | "                   | 5        |
| 4-04-005-55                           | Working-1,1,1-Trichloro-<br>ethane | 0     | 0               | 0               | 5.1  | 0  | "                   | 5        |
| 4-04-005-56                           | Working-Trichloroethylene          | 0     | 0               | 0               | 2.8  | 0  | "                   | 5        |
| 4-04-005-58                           | Working-Vinyl Acetate              | 0     | 0               | 0               | 2.7  | 0  | "                   | 5        |

## REVISED SCC LISTINGS

## Floating Roof Standing

| (Petrochemical)                      | Source                         | Part | SOx | NOx | HC   | CO | Units                      | Action |
|--------------------------------------|--------------------------------|------|-----|-----|------|----|----------------------------|--------|
| 4-04-010-04                          | Standing-Acetone               | 0    | 0   | 0   | 6.2  | 0  | 1000 gal. storage capacity | 5      |
| 4-04-010-06                          | Standing-Acrylonitrile         | 0    | 0   | 0   | 3.1  | 0  | " "                        | 5      |
| 4-04-010-14                          | Standing-Carbon Tetrachloride  | 0    | 0   | 0   | 8.8  | 0  | " "                        | 5      |
| 4-04-010-15                          | Standing-Chloroform            | 0    | 0   | 0   | 11.0 | 0  | " "                        | 5      |
| 4-04-010-19                          | Standing-1,2-Dichloroethane    | 0    | 0   | 0   | 4.4  | 0  | " "                        | 5      |
| 4-04-010-26                          | Standing-Ethylacetate          | 0    | 0   | 0   | 4.4  | 0  | " "                        | 5      |
| 4-04-010-28                          | Standing-Ethyl Alcohol         | 0    | 0   | 0   | 1.4  | 0  | " "                        | 5      |
| 4-04-010-39                          | Standing-Methyl Alcohol        | 0    | 0   | 0   | 1.9  | 0  | " "                        | 5      |
| 4-04-010-42                          | Standing-Methylene Chloride    | 0    | 0   | 0   | 16.1 | 0  | " "                        | 5      |
| 4-04-010-43                          | Standing-Methyl Ethyl Ketone   | 0    | 0   | 0   | 3.7  | 0  | " "                        | 5      |
| 4-04-010-44                          | Standing-Methylmethacrylate    | 0    | 0   | 0   | 1.9  | 0  | " "                        | 5      |
| 4-04-010-50                          | Standing-Isopropyl Alcohol     | 0    | 0   | 0   | 1.6  | 0  | " "                        | 5      |
| 4-04-010-55                          | Standing-1,1,1-Trichloroethane | 0    | 0   | 0   | 8.4  | 0  | " "                        | 5      |
| 4-04-010-56                          | Standing-Trichloroethylene     | 0    | 0   | 0   | 5.5  | 0  | " "                        | 5      |
| 4-04-010-58                          | Standing-Vinyl Acetate         | 0    | 0   | 0   | 4.7  | 0  | " "                        | 5      |
| Variable Vapor Space (Petrochemical) |                                |      |     |     |      |    |                            |        |
| 4-04-011-01                          | Working-Acetone                | 0    | 0   | 0   | 3.8  | 0  | 1000 gal. throughput       | 3      |
| 4-04-011-02                          | Working-Acrylonitrile          | 0    | 0   | 0   | 1.7  | 0  | " "                        | 3      |
| 4-04-011-03                          | Working-Carbon Tetrachloride   | 0    | 0   | 0   | 4.8  | 0  | " "                        | 3      |
| 4-04-011-04                          | Working-Chloroform             | 0    | 0   | 0   | 6.7  | 0  | " "                        | 3      |
| 4-04-011-05                          | Working-1,2-Dichloroethane     | 0    | 0   | 0   | 2.2  | 0  | " "                        | 3      |
| 4-04-011-06                          | Working-Ethylacetate           | 0    | 0   | 0   | 2.2  | 0  | " "                        | 3      |
| 4-04-011-07                          | Working-Ethyl Alcohol          | 0    | 0   | 0   | 0.62 | 0  | " "                        | 3      |
| 4-04-011-08                          | Working-Methyl Alcohol         | 0    | 0   | 0   | 1.0  | 0  | " "                        | 3      |
| 4-04-011-09                          | Working-Methylene Chloride     | 0    | 0   | 0   | 10.0 | 0  | " "                        | 3      |

REVISED SCC LISTINGS

| Floating Roof Standing Petrochemical (cont.) | Source                        | Part | SO <sub>x</sub> | NO <sub>x</sub> | HC   | CO | Units                | Action |
|----------------------------------------------|-------------------------------|------|-----------------|-----------------|------|----|----------------------|--------|
| 4-04-011-10                                  | Working-Methyl Ethyl Ketone   | 0    | 0               | 0               | 1.9  | 0  | 1000 gal. throughput | 3      |
| 4-04-011-11                                  | Working-Methylmethacrylate    | 0    | 0               | 0               | 0.68 | 0  | " "                  | 3      |
| 4-04-011-12                                  | Working-Isopropyl Alcohol     | 0    | 0               | 0               | 0.68 | 0  | " "                  | 3      |
| 4-04-011-13                                  | Working-1,1,1-Trichloroethane | 0    | 0               | 0               | 4.8  | 0  | " "                  | 3      |
| 4-04-011-14                                  | Working-Trichloroethane       | 0    | 0               | 0               | 2.6  | 0  | " "                  | 3      |
| 4-04-011-15                                  | Working-Vinyl Acetate         | 0    | 0               | 0               | 2.5  | 0  | " "                  | 3      |

## REVISED SCC LISTINGS

| Tank Cars/Trucks -<br>Loading | Source                        | Part | SO <sub>x</sub> | NO <sub>x</sub> | HC     | CO | Units                 | Action |
|-------------------------------|-------------------------------|------|-----------------|-----------------|--------|----|-----------------------|--------|
| 4-06-001-01                   | Submerged-Normal Gasoline     | 0    | 0               | 0               | 5      | 0  | 1000 gal. transferred | 3      |
| 4-06-001-02                   | Submerged-Normal Crude        | 0    | 0               | 0               | 3      | 0  | " "                   | 3      |
| 4-06-001-03                   | Submerged-Normal JP-4         | 0    | 0               | 0               | 1.5    | 0  | " "                   | 3      |
| 4-06-001-04                   | Submerged-Normal Jet Kero     | 0    | 0               | 0               | 0.02   | 0  | " "                   | 3      |
| 4-06-001-05                   | Submerged-Normal Dist No. 2   | 0    | 0               | 0               | 0.01   | 0  | " "                   | 3      |
| 4-06-001-06                   | Submerged-Normal Resid No. 6  | 0    | 0               | 0               | 0.0001 | 0  | " "                   | 3      |
| 4-06-001-25                   | Splash-Normal Gasoline        | 0    | 0               | 0               | 12     | 0  | " "                   | 3      |
| 4-06-001-26                   | Splash-Normal Crude           | 0    | 0               | 0               | 7      | 0  | " "                   | 3      |
| 4-06-001-27                   | Splash-Normal JP-4            | 0    | 0               | 0               | 4      | 0  | " "                   | 3      |
| 4-06-001-28                   | Splash-Normal Jet Kero        | 0    | 0               | 0               | 0.04   | 0  | " "                   | 3      |
| 4-06-001-29                   | Splash-Normal Dist No. 2      | 0    | 0               | 0               | 0.03   | 0  | " "                   | 3      |
| 4-06-001-30                   | Splash-Normal Resid No. 6     | 0    | 0               | 0               | 0.0003 | 0  | " "                   | 3      |
| 4-06-001-50                   | Submerged-Balance Gasoline    | 0    | 0               | 0               | 8      | 0  | " "                   | 3      |
| 4-06-001-51                   | Submerged-Balance Crude       | 0    | 0               | 0               | 5      | 0  | " "                   | 3      |
| 4-06-001-52                   | Submerged-Balance JP-4        | 0    | 0               | 0               | 2.5    | 0  | " "                   | 3      |
| 4-06-001-53                   | Submerged-Balance Jet Kero    | 0    | 0               | 0               | 0.03   | 0  | " "                   | 3      |
| 4-06-001-54                   | Submerged Balance Dist No. 2  | 0    | 0               | 0               | 0.02   | 0  | " "                   | 3      |
| 4-06-001-55                   | Submerged-Balance Resid No. 6 | 0    | 0               | 0               | 0.0002 | 0  | " "                   | 3      |
| 4-06-001-75                   | Splash-Balance Gasoline       | 0    | 0               | 0               | 8      | 0  | " "                   | 3      |
| 4-06-001-76                   | Splash-Balance Crude          | 0    | 0               | 0               | 5      | 0  | " "                   | 3      |
| 4-06-001-77                   | Splash-Balance JP-4           | 0    | 0               | 0               | 2.5    | 0  | " "                   | 3      |

REVISED SCC LISTINGS

| <u>Tank Cars/Trucks -<br/>Loading (cont.)</u> | <u>Source</u>              | <u>Part</u> | <u>SO<sub>x</sub></u> | <u>NO<sub>x</sub></u> | <u>HC</u> | <u>CO</u> | <u>Units</u>          | <u>Action</u> |
|-----------------------------------------------|----------------------------|-------------|-----------------------|-----------------------|-----------|-----------|-----------------------|---------------|
| 4-06-0001-78                                  | Splash-Balance Jet Kero    | 0           | 0                     | 0                     | 0.03      | 0         | 1000 gal. transferred | 3             |
| 4-06-001-79                                   | Splash-Balance Dist No. 2  | 0           | 0                     | 0                     | 0.02      | 0         | " "                   | 3             |
| 4-06-001-80                                   | Splash-Balance Resid No. 6 | 0           | 0                     | 0                     | 0.0002    | 0         | " "                   | 3             |
| 4-06-001-99                                   | Other-Specify              |             |                       |                       |           | " "       | " "                   |               |
| Delete all other 4-06-001 Classifications     |                            |             |                       |                       |           |           |                       |               |

## REVISED SCC LISTINGS Continued

| <u>Marine Vessels</u> | <u>Sources</u>                | <u>Part.</u> | <u>SO<sub>x</sub></u> | <u>NO<sub>x</sub></u> | <u>HC</u> | <u>CO</u> | <u>Units</u>         | <u>Activity</u> |
|-----------------------|-------------------------------|--------------|-----------------------|-----------------------|-----------|-----------|----------------------|-----------------|
| 4-06-002-01           | Loading Clean Ships-Gasoline  | 0            | 0                     | 0                     | 1.3       | 0         | 1000 gal transferred | 3               |
| 4-06-002-02           | Loading Dirty Ships-Gasoline  | 0            | 0                     | 0                     | 2.5       | 0         | " "                  | 3               |
| 4-06-002-03           | Loading Clean Barges-Gasoline | 0            | 0                     | 0                     | 1.2       | 0         | " "                  | 3               |
| 4-06-002-04           | Loading Dirty Barges-Gasoline | 0            | 0                     | 0                     | 3.8       | 0         | " "                  | 3               |
| 4-06-002-05           | Loading General-Crude         | 0            | 0                     | 0                     | 1.0       | 0         | " "                  | 3               |
| 4-06-002-06           | Loading General-JP-4          | 0            | 0                     | 0                     | 0.5       | 0         | " "                  | 3               |
| 4-06-002-07           | Loading General-Jet Kero      | 0            | 0                     | 0                     | 0.02      | 0         | " "                  | 3               |
| 4-06-002-08           | Loading General-Dist. No. 2   | 0            | 0                     | 0                     | 0.005     | 0         | " "                  | 3               |
| 4-06-002-09           | Loading General-Resid No. 6   | 0            | 0                     | 0                     | 0.00004   | 0         | " "                  | 3               |
| 4-06-002-25           | Transit Gasoline              | 0            | 0                     | 0                     | 3         | 0         | " "                  | 3               |
| 4-06-002-26           | Transit Crude                 | 0            | 0                     | 0                     | 1         | 0         | " "                  | 3               |
| 4-06-002-27           | Transit-JP-4                  | 0            | 0                     | 0                     | 0.7       | 0         | " "                  | 3               |
| 4-06-002-28           | Transit-Jet Kero              | 0            | 0                     | 0                     | 0.02      | 0         | " "                  | 3               |
| 4-06-002-29           | Transit-Dist. No. 2           | 0            | 0                     | 0                     | 0.005     | 0         | " "                  | 3               |
| 4-06-002-30           | Transit-Resid No. 6           | 0            | 0                     | 0                     | 0.00003   | 0         | " "                  | 3               |
| 4-06-002-99           | Other Specity                 | 0            |                       | 0                     | 0         | 0         | 1000 gal transferred | 3               |

Delete all other 4-06-002

REVISED SCC LISTINGS Continued

| Underground Gasoline Storage | Source            | Part. | SO <sub>x</sub> | NO <sub>x</sub> | HC  | CO | Units               | Activity |
|------------------------------|-------------------|-------|-----------------|-----------------|-----|----|---------------------|----------|
| 4-06-003-01                  | Splash Loading    | }     | No Change       | }               | }   | }  | }                   | }        |
| 4-06-005-02                  | Sub Load-Uncont.  |       |                 |                 |     |    |                     |          |
| 4-06-003-03                  | Sub Load-Opn Sys. |       |                 |                 |     |    |                     |          |
| 4-06-003-04                  | Sub Load-Cls Sys. |       |                 |                 |     |    |                     |          |
| 4-06-003-05                  | Unloading         |       |                 |                 |     |    |                     |          |
| 4-06-003-99                  | Specify           |       |                 |                 |     |    |                     |          |
| <u>Fill Vehicle Gas Tank</u> |                   |       |                 |                 |     |    |                     |          |
| 4-06-004-01                  | Vapor Disp. Loss  | 0     | 0               | 0               | 9.0 | 0  | 1000 gallons pumped | 4        |
| 4-06-004-02                  | Liq. Spill Loss   | 0     | 0               | 0               | 0.7 | 0  | " "                 | *        |
| 4-06-004-99                  | Other Specify     | 0     | 0               | 0               |     | 0  | " "                 | *        |